

A Database Publication

# electron User

Vol. 4 No. 3 December 1986 £1



*Two great games  
for Christmas...*

**Santa's Sleigh & Yule Spell**

Turtle graphics on the  
Electron: full listing

How to keep track of  
your function keys

# THE ADVENTURE CREATOR



The HIGHLY ACCLAIMED Adventure generating system is now available for the Electron computer. You can create your own professional 'stand alone' adventure games with **The Adventure Creator**. The intelligent command interpreter can handle complex sentences and multiple input commands in your own adventures. Extensive text compression allows you to produce more numerous and detailed location descriptions.

Some of the many features include a full function editor, automatic word formatting, a logical command interpreter and an abbreviated input acceptance facility.

An EXTRA feature, added specially for the Electron Adventure Creator, is the additional command 'chain' that allows you should you so wish, to create MASSIVE multi part adventures.

Unleash the power of your imagination now! The Adventure Creator for your Electron or BBC. Available from all leading retailers or direct from Incentive on (07356) 77288.

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Shoot the activator to open the sliding entrance door.



#### REVIEWS OF THRUST ALREADY PUBLISHED

**Zzap! 64:** "The most enjoyable game we've played for ages..."  
— A ZZAPI SIZZLER.

**Computer & Video Games:** "Thrust is a simple but totally addictive game..." — A C+VG HIT!

#### Now available for the BBC Micro and Electron

The Commodore-64 version of Thrust (published by Firebird Software) shot immediately to No.1 in the software charts and was greeted with rave reviews throughout the computer press. Equally addictive and just as enjoyable, the BBC Micro and Electron versions of the game are set to emulate this performance.

Thrust is simple, fun-to-play, yet totally realistic and intensely challenging. Your mission is to visit 24 planets in turn collecting the Klystron Pods and, if possible, destroying each planet's reactor system. Your spaceship and the pods, which are heavier than the spaceship, move authentically subject to the laws of gravity, inertia and momentum — indeed the game's author, Jeremy Smith holds a First-Class Honours degree in Physics! Careful planning of your manoeuvres is essential in order to prevent the pods swinging out of control and dragging your spaceship to destruction.

To add to the challenge, the planets have different gravity rates and, as you progress through the game, some have "reverse gravity" or "invisible landscapes". They are defended by automatic limpet guns strategically placed to protect the pods and fuel tanks — the only source of replenishment for your limited fuel supply. The smooth screen-scrolling, which is exemplary, and the realistic action gives the player a fascinating feeling of floating through space.

**PRICE: £7.95 (cassette), £11.95 (BBC disc)**

BBC  
MICRO

ELECTRON

#### COMPETITION COMPETITION COMPETITION COMPETITION

If you complete the mission by collecting the pods from all 24 planets, you can enter our competition. The prizes include the beautiful trophy (pictured on the right), £250 cash, and 3 copies of the captivating book "The New Atlas of the Universe" by Patrick Moore. Closing date: 31st January, 1987.



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December 1986



AMX Art in action

## DISC DRIVE PRICES SOAR

A WARNING has gone out to Electron users that the price of disc drives is about to go through the roof.

The message that is coming over loud and clear is: Buy now or pay more later.

More and more Electron owners are turning

to disc drives because they want to be able to exchange programs freely with their BBC Micro-owning friends.

But the price of doing this is rising – a survey has shown that the current wholesale price

**Turn to Page 6**

## Now Electron can have its own mouse

A FURTHER hurdle in the technology needed to make the Electron as powerful as the BBC Micro has been overcome.

The machine is now compatible with the best-selling AMX Mouse and the AMX Art package.

"We see this as one more step along the way to lift the Electron to the BBC Micro's specifications", said John Huddleston of Advanced Computer Products, the



company behind the breakthrough.

To achieve this, ACP first perfected its AP5 which effectively adds three more interfaces to the machine.

This combines a 1 MHz bus, a user port providing the same I/O as the BBC Micro and a Tube interface in a triple interface cartridge for £67.70.

Now ACP has come up with the software to enable the AMX Mouse from AMS to be linked to the AP5 user port.

As a result of a deal with AMS, ACP is now offering the AMX Mouse and AMX Art along with the specially written software for £69.95.

The original Mouse for the BBC Micro sold 10,000 units in the first nine months alone and

became a finalist in the Peripheral of the Year Award 1985.

AMX Art is a computer aided drawing program using windows, icons, pull-down menus and pointers for producing professional standard drawings – or mere doodles that can be saved and printed.

It is certainly not the first time that Advanced Computer Products has helped boost the performance of the Electron.

The company's AP4 – the predecessor of the AP5 – was a disc interface which opened up the Electron to a vast pool of software previously restricted to the BBC Micro.

Featuring a 1770 DFS as standard running with Page at & E00, it costs £69.95.

## Santa goes on line

MESSAGES to Father Christmas need not depend on the efficiency of the postal service this year.

To ensure that every child can contact him before the big day, the jolly old fellow has gone on line up at the North Pole.

Equipped with an Electron no less, Santa has hooked up his

workshop to the giant MicroLink computer in the UK.

Now all that kiddies – or their parents – have to do to contact him is to transmit their message via micro and modem.

SantaLink is the latest service being offered through the country's fastest growing electronic mail and

messaging service.

All MicroLink subscribers have to do is type SANTA at the prompt when they go on-line, and then enter their message.

And Father Christmas guarantees that every message sent to him will get through – and be answered personally – right up to Christmas Eve.

# Electron aid in education

AN Electron at the Brookside Training Centre, Southampton, is helping mentally handicapped teenagers and adults learn the

three Rs. An average of 170 people come from all over the Southampton area each day to take part in the centre's many activities.

These include horse riding and swimming – but none is more popular than computing.

"We are using the Electron as an aid to further education, teaching spelling, reading and some basic maths", said centre manager Tom Burn.

"It's amazing to see how fascinated our students have been by the computer, right from the word go."

"I think this is because every time they press a key something interesting happens on screen."

## Absorbed

"Because they are so absorbed in what is going on they tend to learn better."

"We are not unique at Brookside – other training centres in Hampshire are going ahead in computing – but we think we are as progressive as any."

"We have gradually built up from one computer to five and hope to add more soon".

## TIME TRAVELLER

AN updated version of the space arcade game Thunderstruck is shortly to be released for the Electron by Audiogenic.

Playing Spreco, a space refuse collector, you find yourself transported back to the 10th century. Your task is to return to the present time.

Incorporating stunning graphics and puzzles with a varying level of difficulty, Thunderstruck is available on tape, price £7.95.



## JOYFUL MD...

FOR the first time since launching its Speed King joystick, Konix is confident it can meet all orders from Electron users.

Since the product first came out last January UK demand has outstripped supply three times over, despite the production of 100,000 units.

During the summer an order for 60,000 joysticks – versions are made for a dozen makes of micro, including the

Electron – had to be turned down.

But now production has been ramped up from 3,500 to 50,000 units a week.

And Konix managing director Wyn Holloway (above) says Electron owners shouldn't have to wait for Speed Kings.

"We now have 120 people working in two shifts to ensure that there are no more waiting lists for these joysticks", he told *Electron User*.

## Prices warning

### From Page 5

of disc drives in the UK is around 40 per cent higher than at this time last year.

The main reason for this is the poor showing of the pound against the Japanese yen – a situation that is unlikely to improve in the immediate future.

"Last year saw 400k drives on sale for as little as £80, whereas now you're looking at an RRP of around the £120 mark", says Barry Rubery of Pace Micro Technology.

Spokesmen for several other disc drive

suppliers confirmed this when interviewed by *Electron User*.

"If Electron owners want to buy a disc drive, they had better buy now", said a representative of Twillstar.

A Watford Electronics spokesman said: "We are subject to problems with the pound just like anyone else, so there is no way any price guarantees can be given.

"But we intend to keep our prices down as long as we possibly can by buying at the right price and staying well ahead of the game – that's the key".



## The way into wonderland...

HIGHLY successful adventure generating system Adventure Creator has at last been made available for the Electron.

The Incentive Software product allows Electron owners to create their own professional stand-alone adventure games.

Its intelligent command interpreter can handle complex sentences and multiple command lines.

Also included is "it" detection, whereby "Take the box and open it carefully. Examine the silver charm and then put it in the box", is a perfectly valid input.

This allows the user to create more detailed and more numerous location descriptions to improve the playability of adventures.

With a full function editor, Adventure Creator features automatic word formatting, a logical command interpreter and abbreviated input acceptance.

It will recognise and distinguish words like river/rivet, screw/screen and trout/trousers – not just the first few letters.

An extra feature added specially for Electron users is the additional command CHAIN that allows creation of large adventures split

into several parts.

Other features include alphabetical word scanning and sorting, and the ability for objects to have individual characteristics like weight and cost.

The program also offers full diagnostic screens showing current status of the 255 markers plus 128 counters, the acceptance of synonyms, high, low priority and local conditions.

Electron owners who use Adventure Creator to write software are being asked to submit it to Incentive for possible inclusion in the firm's new Medallion Adventure series.

Adventure Creator is supplied complete with two example datafiles, including an easy-start file Quickstart. Price £14.95 on cassette.

## ARCADE ADVENTURE

LATEST release in the Strobe budget range from IJK for the Electron is Quest for Freedom.

The machine code arcade adventure has 55 different screens, 32 aliens, 60 backgrounds, and 80 walls.

There are cartoon style graphics and puzzles on each screen. Price £1.99.

# ACORN SOFTWARE ELECTRON BONANZA

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"I can recommend it to anyone contemplating upgrading to disc".

Electron User, June '86

"The AP4 should be considered the standard interface for the Electron".

Acorn User, July '86

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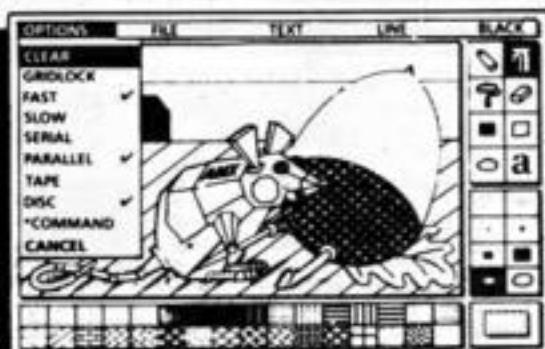
Plug the MOUSE into the user port, and the EPROM into your A.P.5. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be programmed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications - such as the preparation of detailed architectural and engineering drawings or teachers' worksheets - as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The ACP/AMX mouse package may be used on an ELECTRON fitted with a PLUS 1 & AP5. The 'ART' software is supplied on cassette but can be transferred to DISC (DFS not ADFS)



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# Advanced Computer Products

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**ADVANCED PLUS 4**  
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"Disc drive compatibility at long last" ... Electron User June '86. "The AP4 should be considered the standard interface for the Electron" ... Acorn User July '86. This sums up AP4 & ACP's approach to producing products. AP4 is a fully ACORN compatible disc interface & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B+ & Master), keeps page & E00, utils in ROM & provides a spare rom socket. "ACP's Plus 4 comes out on top. I can recommend it to anyone" ... Electron User, June '86.  
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please include your tel. no.)



CREDIT CARD No. ....



# Seeking the definitive list of adventures

**WELL Merlin said that I would need my wits about me, plus a touch of Magik at times. Of course he was right — Merlin's always right!**

My first month in the cave has been hectic to say the least. I have been inundated with useful tips, advice and pleas for help. Poor Kay and Ector have no finger-nails left from opening my mail for me, and the Wart thinks it's Christmas every day.

Still we'll endeavour to answer all letters which include an sae, but please

write your christian name or at least say whether you are Mr Mrs or Miss.

Mordred gets most annoyed when he sees me starting all the letters with "Dear Sir or Madam". And it does make this column sound far too formal.

The mail bag is currently running at about 100 letters a week, so I must make it clear that although I welcome any correspondence concerning adventures I simply do not have time to answer queries on arcade games such as Citadel and Sim. While on the

subject of mail, may I thank Graham Thompson for his highly amusing epistle, and John McLaren for a literary Magnum Opus. I am sorry I couldn't answer all of your 39 questions John.

I hope to carry on with the same excellent service provided by Merlin for so long. I also intend to introduce a few new ideas, including a Beginner's column to give advice and guidelines to the novice adventurer.

And there'll be the occasional competition, with some software treasures from

the deeper recesses of the cave as prizes.

So get your pens ready. For starters there's a copy of Robico's Mayorem for the first full solutions I receive to Philosopher's Quest and Circus.

Perhaps my most ambitious project is to complete a definitive list of adventures available for the Electron, to be published in a future issue of *Electron User*.

However, I can't do this without your help, even though I am aware of most adventures on the market for

## PROBLEM SOLVED

Robert Henderson, Melody Barnes, A. Fernie and Jonathan Blair all seem to be facing problems finishing **Hampstead**.

You must prise open the filing cabinet with the screwdriver to reveal an interesting report.

Say to the Butler SEE CHUBBY then follow him. Give his Lordship the memo and the report.

Don't give Pilgrim the banker's draft Robert, use it to buy a house — a much sounder idea!

To finally earn that BSc (Barefaced Social Climber) Diploma you should return to your roots and pick up an "old friend".

Melody and her dad can't figure out LIM RAY BARNOW — sorry I mean Barry Manilow's room number in **Pettigrew's**

### Diary.

You must visit a certain lady in the red light district and listen to her tale.

Another young lady is stuck at the beginning of **The Ferryman Awaits** — try saying NIMLAX, Sarah and watch the priest's face.

Christopher Brammall's problem with **Greedy Dwarf** is easily solved, thanks to Simon Ainsworth's map.

You can only progress north of the Cave of Echoes if you have the amulet in your possession. Also Chris, watch out for the red herrings.

**Woodbury End** appears to be foxing a lot of people this month, in fact it has driven Jeff Lewis to utter despair.

You can glean a lot of information from the

characters in the game. There are 14 and when one appears, talk to him.

If you meet the same person again have another chat, he may have something different to say.

Of course five of them are aliens — "Which five?" asks Frazer McDermott. Well, I'm not telling, but these hints may help your detection work:

- A tree etching points to one.
- H P is a hero but someone wants to kill him.
- Who rides a bicycle?
- Someone is telling fibs.
- One alien is female.

Jeff, and Frazer and Graeme Dignan are puzzled by the cube and block. Don't carry them together, but lined up they point the way.

### Wheel of Fortune

kept Merlin busy with the problems it gave readers, and it looks as if it will not give me any respite either.

Tim Adamson asks some quite pertinent questions about the adventure.

How do I get out of jail? You can't.

Can I open the trap door in the wooden building from above?

It is bolted from underneath, so the answer is again no.

Is it possible to climb down the well rope without it snapping?

No, you'll have to get the beggar to lower you down in the bucket — but give him a penny first.

Finally, in Softek's **Eye of Zoltan** get the water from the temple for the beans, Graham. The magic word is Minotaur!

# First find the right one

## BEGINNERS

Whether pride allows us to admit it or not, we were all beginners to adventures once (yes, even Saxon kings!) and faced such problems as "What do I do with this lamp and that bottle?"

Therefore over the coming months I'm going to provide a section devoted to those among you who are new to adventuring.

And it might help those who have tried several adventures but always seem to end up, very early in the game, faced with "Do you want to be reincarnated?"

The first decision you take is choosing the adventure itself. With so many available there are good and bad, suitable and not so suitable.

Look for good informative liner notes on the cover,

which should tell you a little about the scenario of the adventure and help build the atmosphere.

Don't confuse this with a company's advertising blurb, and don't be taken in by price either.

There are some super cheapie adventures - Twin Kingdom Valley is a fine example - but also there are a few dreadful ones in the £9 price bracket.

A couple of excellent beginner's adventures are Adventuresoft's Voodoo Castle and Adventureland.

Before actually parting with your hard-earned cash, it may be prudent to ask the shop for a trial run of the adventure.

Most small specialist computer shops are only too willing to let you try out

software and this is a good way of ensuring that you are satisfied before you take the adventure home.

But don't be surprised if the bigger stores don't offer the same service. They are usually too busy, despite being keen to help.

Lastly if you really want to make sure that you are buying the right adventure, try borrowing a friend's copy - but don't rip it off.

Next month I'll deal with getting started, some moves to try, what to look out for and some early strategy.

I'll also be continuing Merlin's idea of including a series of maps to help you through some particularly interesting sections of adventures.

Until then, happy adventuring.

the Elk. There is many a tiny software house tucked away in the hills of Wales or above a chip shop in Bradford which occasionally produces an excellent adventure.

For instance, has anyone heard of Adventure of the Stone by Wilsonsoft?

If you come across any company that does not get widespread publicity and which produces adventures for the Electron, write in and let me know.

Hopefully that list will become a reality in the not too distant future.

Simon Nowell, N.Wilson and others have written in seeking advice on publishing home-penned adventures.

All I can suggest is that if you think you have written a really exceptional game, send an appraisal copy of it to an established adventure software house such as Robico or Level 9.

Martin Ashworth suggests I hold a competition for the best home written adventure. With so many writing aids on the market, such as Gilsoft's The Quill, this is feasible.

If you think such a competition is a good idea, write in and tell me.

By the way, keep those marks coming in for your

favourite adventures. A typical set of marks out of 10 might be similar to those sent in by Martin Edmondson for Bug Byte's Twin Kingdom Valley:

Presentation .....	7
Contents .....	8
Value for Money .....	7
Frustration Factor .....	9
Atmosphere .....	6

The next Top Twenty will be published in the February 1987 issue.

Thanks to the following people for their complete solutions: Douglas Lockwood for Pettigrew's Diary, Robert Henderson for Rick Hanson, Graeme Dignan and Richard Craig for Terrormolinos.

Also Robert Redrup for Twin Kingdom Valley, James Siddle for Crown Jewels and Sheila Beattie for her superb route through The Ferryman Awaits.

And thanks to Ray Winchurch for another save-game routine for Sphinx, and Simon Doyle for a useful listing to provide single key entry of commands for the same game, which I shall include next month.

By the time you read this there should be plenty of exciting new adventure games on the shelves ready for the

Christmas buying spree.

Robico's excellent Myorem perhaps heads the list of recent releases but also look out for the company's latest game, a wild west adventure titled Blazing Star.

It promises to be original and up to the usual high standard of presentation.

Rob O'Leary at Robico also tells me that the Rick Hanson trilogy is now released in one bumper package for £23.95 - a saving of £5.90 on buying them separately.

Dave Johnson informs me that Epic's long awaited blockbuster will soon be available.

He promises over 240 locations with Mode 5 graphics - watch out for my review of what could be the adventure of the year.

Shards' Operation Safras - remember the Safras caves in Pettigrew's Diary? - is now in the shops and is every bit as good as Woodbury End.

A number of readers including Nik Measures, Michael Tudor and Geoff Livesey have asked whether Magus is going to convert its fabulous Village of Lost Souls for the Electron.

Well the answer is yes, and it is nearly ready. I suggest that you drop Santa a letter asking for a copy this Christmas time.

## LORDS OF ADVENTURE

I hereby bestow the title of KCA (Knight Commander of Adventure) upon the following:

Jonathan Colhoun  
Ashville, 75 Galgorm Road,  
Ballymena, County Antrim  
BT42 1AA who offers help  
with *Hampstead*, *Terrormolinos*, *Twin Kingdom Valley*, *The Hulk*, *Eye of Zoltan*, *Sphinx*, *Firienwood*, *Pyramid of Doom*, *Greedy Dwarf*, *Gremmels*, *Spiderman*, *Adventure*, *Stranded* and *Crown Jewels*.

Craig Romans, 1  
Glamorgan Street, Barry,  
South Glamorgan, South  
Wales CF6 8JP. He can  
give help with *Stolen Lamp*, *Wheel of Fortune*,  
*Countdown to Doom*,  
*Mystery of the Java Star*, *Stranded*, *Twin Kingdom Valley* and *Greedy Dwarf*.

Don't forget - if you are writing to a Lord of Adventure for help, please enclose a stamped addressed envelope.

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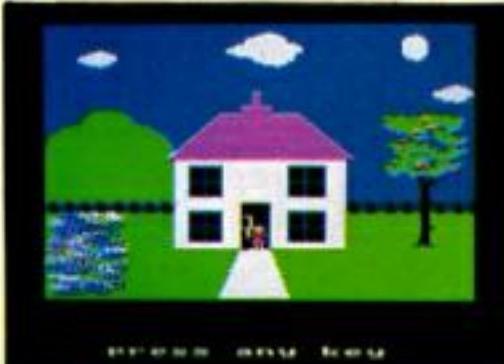
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*Find the word that does not fit – before your time runs out*

**TO ORDER TURN TO THE FORM ON PAGE 61**

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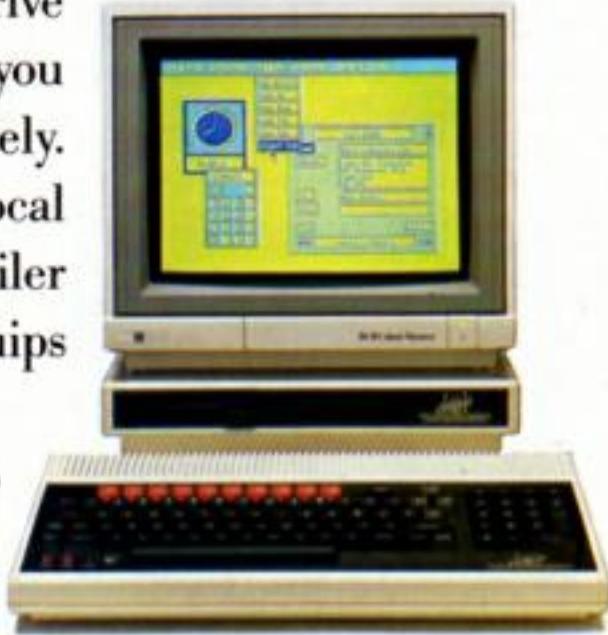
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## Best compilation bargain

Program: MicroPower Magic  
Price: £7.95  
Supplier: MicroPower, Northwood House,  
North Street, Leeds LS7 1AX.  
Tel: 0532 458800

MICROPOWER Magic is a compilation of ten previously released games on two cassettes.

Stock Car is a motor racing game for one or two players. Power your car round a choice of six circuits, dodge the computer controlled cars and oil slicks. A variable skid facility lets you slide the car round bends – very realistic.

Felix Meets the Evil Weevils is a ladders and levels game. The factory is infested with killer weevils and you must search the conveyors for the nasty beasts, zapping them with your aerosol. But watch out for the ball bearings on the conveyors! A fun game but lacking in colour.

Escape from Moonbase Alpha was one of the first ever arcade adventure games. In its time it was a breakthrough

but by today's standards it's a bit of a joke.

Swag is a story of two hillbilly crooks. In this one or two player game you run around the screen collecting diamonds, avoiding the security droids and police cars. Swag is an updated version of the classic Zombie.

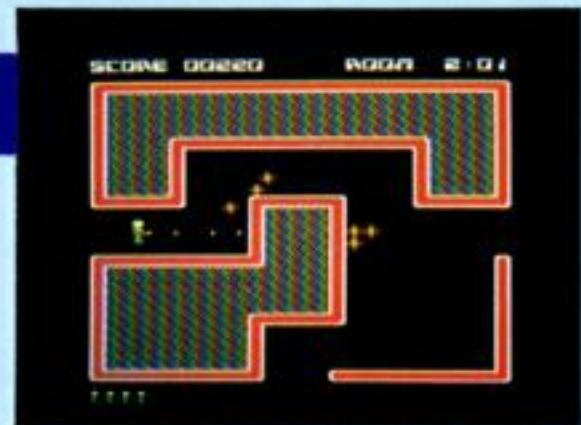
MicroPower Chess is an excellent program. It plays a good fast game and is brimming with facilities.

Bandits is a First World War dogfight game. Battle it out with a computerised Red Baron or one of your friends. The characters are simple and the animation jerky, but the game is still very playable.

Galactic Commander gives you the opportunity to demonstrate your piloting abilities as you fly a lunar lander through a series of increasingly difficult missions.

The game employs some very nice high resolution graphics but as they are drawn in magenta on a blue background they are virtually invisible. Apart from this the game is still very challenging.

Adventure is a text only adventure game. Though not up to Level 9 standards it should still keep you off the



streets for a few hours.

Of all of the old MicroPower games Cybertron Mission is one of my favourites. Run through an alien infested maze searching for treasure. It's a great rapid fire shoot 'em up game.

European Challenge is an educational quiz. How did that get in here? Each round consists of forty multiple choice questions.

For less than 80 pence per program this must be the bargain of the year.

**James Riddell**

Sound .....	6
Graphics .....	8
Playability .....	8
Value for money .....	10
Overall .....	8

## Kane in for a caning

Program: Kane  
Price: £1.99 (cassette)  
Supplier: Mastertronic, 8-10 Paul Street,  
London EC2A 4JH.  
Tel: 01-377 6880

KANE is a man with problems. As sheriff he must make peace with the Indians and pump the town's bandits full of lead.

Stage one involves Kane shooting birds with a bow and arrow. You fire the bow by moving the cursor to the desired impact point and press Return.

The skill lies in judging how far in front of the bird to fire, which depends on the bird's altitude, distance and velocity. A direct hit results in the bird plummeting earthwards.

You begin with 10 arrows, and every time you kill a bird you get your arrow back. You also receive an extra life for every three birds shot. The carnage takes place against a pretty mountain scene. Sound effects are very good – the arrows fly with a nice thwack and dead birds hit the deck with a realistic thud. The

instructions say that the next stage involves a race across the desert on horseback, jumping over bushes. Not in my version it doesn't – the program went straight to scene three.

Standing at one end of the main street you stare at the buildings, scrutinising every doorway for tell-tale signs of movement. A hand appears at the saloon door, you run across the street, move your cursor into position, and Black Jake bites the dust. Before you know what's happening the buildings are buzzing with bandits.

Kane is very difficult to control. I had to press a key three times on numerous occasions just to get him to change direction.

Whatever you do you must keep moving. If you stand still for too long you'll end up an ex-sheriff. You can re-load your pistol by running off the right side of the screen, but you must choose your time to return carefully.

Everybody knows where you are going to appear, so you need to wait until there are only a few baddies on the screen



before returning.

Having shot 10 bad guys you can proceed to scene four. What! no scene four! Come on Mastertronic what are you playing at? The instructions say that scene four consists of racing to stop a hijacked train. It's a pity that the programmer didn't read them.

The game may cost only £1.99 but I can't help feeling that Mastertronic will receive a few letters of complaint about this one.

**Jon Revis**

Sound .....	6
Graphics .....	7
Playability .....	4
Value for money .....	6
Overall .....	6

## Adventure with errors

**Program:** *The Twin Orbs of Aalinor*

**Price:** £3.95

**Supplier:** Potter Programs, 7 Warren Close, Sandhurst, Camberley, Surrey GU17 8JR.

**Tel:** 0252 877608

'THE first age of Aalinor saw the rising of Gorgoroth, Lord of the Underworld. In that time great evil was done to the fair works of Aalinor and its people.'

The noble and wise Lord Geremot tried to harness the power of two magic orbs to defeat the evil, but he was defeated and sucked into a time vortex and the twin orbs were lost.

You must recover both orbs and fuse them to set free Lord Geremot and to ensure that the evil of Gorgoroth does not rise again.

The opening scenes of this adventure are strikingly similar to the Magus masterpiece Village of Lost Souls. Unfortunately Orbs isn't quite in the same league.

Despite marvellous room descriptions and wise setting of puzzles the game is littered with spelling mistakes and simple

grammatical errors: "The Carpenter works busilly" is a prime example.

I wish more software companies would employ proof readers for their products, as Potter aren't alone with this particular problem.

However, most of the location descriptions are atmospherically set and make the bones tingle: "A rotting corpse, writhing with maggots and covered in festering boils lies on the floor."

My mistake was in examining the corpse, for I soon discovered black boils erupting all over my skin and felt decidedly poorly. The computer informed me I had died of the dreaded lurgy and was now an ex-adventurer!

It's funny, the symptoms were pretty similar to Black Death. I had always thought that the lurgy was dreamed up by the Goons - we learn something every day.

I later found myself "hanging on the clapper of a huge iron bell, which is crusted with the sulphurous deposits from the smokes that rise from below."

I was surprised that I couldn't Take and Search and the failure to condense SOUTH to S was most annoying - these



are surely things which Potter could put right.

I also feel that being told you are of "Neanderthal Intellect" may insult some adventurers.

Nevertheless this is an adventure which I would happily slot into my Top Ten, though Potter has some way to go before it seriously challenges the quality of Robico, Shards or Epic.

**Pendragon**

<b>Presentation</b>	3
<b>Atmosphere</b>	9
<b>Frustration Factor</b>	7
<b>Value for money</b>	9
<b>Overall</b>	8

## Boding well for Future

**Program:** *Future Shock*

**Price:** £7.95

**Supplier:** Tynesoft, Addison Industrial Estate, Blaydon-upon-Tyne, Tyne & Wear NE21 4TE.

**Tel:** 091 414 4611

EVEN the Supreme Being gets weary at times when it comes to the job of creation. It was on one such occasion that he decided to sub-contract the job to a bunch of cowboys from the Galactic Corporation.

Following a night on the town they awoke to discover that they had lost the scroll of evolution - the blueprint for the human race.

You play the role of Glob the blob, a large squat ball with big eyes and a mouth. He has been chosen to locate the 16 pieces of the scroll and reassemble them.

Future Shock uses a novel screen design. At the top are the eyes of the all-seeing supreme being and below is a

large graphic window in which the action takes place. At the sides are a score board and a large candle.

A slowly burning candle is used to depict Glob's life expectancy but the rate of burn increases dramatically if Glob comes into contact with any alien beings.

Glob's life span can be increased by collecting the power pills to be found on several of the screens. It wasn't until I'd played the game for some time that I realised these pills were also the segments of scroll for which I was searching.

You can examine the pieces of scroll you collect by using a pull down menu. Key number one displays a menu which lets you manipulate the puzzle pieces. Other menus give you access to the sound controls and the number of pieces you've found.

The game's graphics are identical to those used in Bug Eyes 2. All characters are huge, chunky and colourful, putting them fairly and squarely into what I would call the cute category. Controls are



limited to left and right movement, but you can travel up or down by using the lifts found on most of the screens, or by falling off a ledge.

Also, an anti-gravity shaft runs through the centre of the maze and while floating up through the shaft you can drift to the left or right.

Future Shock is an excellent program, a game which overflows with character and humour.

**Jon Revis**

<b>Sound</b>	8
<b>Graphics</b>	9
<b>Playability</b>	9
<b>Value for money</b>	9
<b>Overall</b>	9

## An excess of magic

Program: Galadriel in Distress

Price: £2.95

Supplier: Potter Programs, 7 Warren Close, Sandhurst, Camberley, Surrey, GU17 8JR.

Tel: 0252 877608

KING Theoden's daughter, the Princess Galadriel, has been abducted by the sorcerer Grima.

Unfortunately Grima was put to death by a member of the king's guard before he could reveal the fate of the princess. As captain of the king's guard, it is up to you to make amends.

The Potters inform me that Galadriel is the easiest of their games and as such is a beginner's adventure.

I tend to agree as it has only 33 locations and provides a good introduction to the parlance and nature of text adventures.

However, though the program holds some interest, it lacks real atmosphere and has a very limited vocabulary. Room descriptions are usually of only two lines in length and input is restricted to the outdated two word command.

For me the biggest let down is the

absence of any subtlety of action - Get and Drop being the most common manoeuvres you make.

On the credit side there are some excellent problems to solve and one superb chaining puzzle.

In the Summer house you have to eat something tempting and catch something less tempting to feed to a toad. Then - parodying The Princess and the Frog - you must kiss the toad.

The problem doesn't end there as you must now search for an antidote to toad poisoning!

I must admit that I am not overly fond of magical adventures - I even found Level 9's Red Moon somewhat boring. The random use of so called magical words doesn't call for much use of the old grey matter nor does it constitute real puzzle solving.

To that end, I found the over use of magic in such a small adventure more than frustrating.

The Potters seem to have an aptitude for devising excellent puzzles but fall short on text compression and hence atmosphere - surely use of Mode 4 is a loss of valuable memory.

It is a shame, because I feel that



Galadriel had the makings of a super little adventure but remains under-developed.

At £2.95 it remains a bargain and may provide some hours of enjoyment for the true novice.

**Pendragon**

<b>Presentation</b>	3
<b>Atmosphere</b>	4
<b>Frustration Factor</b>	5
<b>Value for money</b>	8
<b>Overall</b>	6

## Struck, by thunder!

Program: Thunderstruck

Price: £7.95

Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA.  
Tel: 0734 303663

WHILE doing your rounds as a cosmic dustbin man you are struck by a space/time thunder storm. As a result of this you find yourself trapped in an eerie medieval castle. All you want to do is get back to Myrtle and the kids before your dinner gets cold.

The castle has eight floors which can be accessed in any order once you have located the castle's lift room. Using the cursor keys you can select a floor, then set the mechanism in motion and ascend or descend to a new level.

You will discover many objects, most of which have a specific function. If you are to escape from the castle you must use each object correctly, but due to the restraints of your bulky spacesuit you can

only carry one object at a time.

One of the easier puzzles can be found in the basement. When trying to access this level you find that the screen goes blank. Wishing to throw a little light on the problem you collect the candle which you saw on a higher level, but you are informed that it is not lit.

I spent a long time burning my fingers on the flaming torches trying to light the candle until I explored the other levels and found a suitable match. Returning to the basement I was greeted by a whole new floor.

One of the bigger puzzles involves lowering the drawbridge. On your travels you will see several large letters, and when you pick them up you are told that they operate the drawbridge. The letters D O and N are easily located, but I have yet to find a W to complete the sequence.

You have only one life, which you lose when your energy reserve is reduced to zero. This energy is lost through contact with flames and the castle's inhabitants, the most deadly being your own droids.



They blame you for their incarceration and are fatal to the touch.

The game's graphics are big and brightly coloured. The puzzles vary in their levels of difficulty and provide you with early success and an incentive to continue playing the game. Thunderstruck is one of the best arcade adventures that I have played on the Electron.

**Carol Barrow**

<b>Sound</b>	6
<b>Graphics</b>	8
<b>Playability</b>	9
<b>Value for money</b>	8
<b>Overall</b>	8

# Christmas Crackers

6  
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**Snowplough.** Clear the snow – but watch out for dangerous rocks and flying snowballs.

**Snap.** Colourful family fun in this seasonal variation of an old favourite.

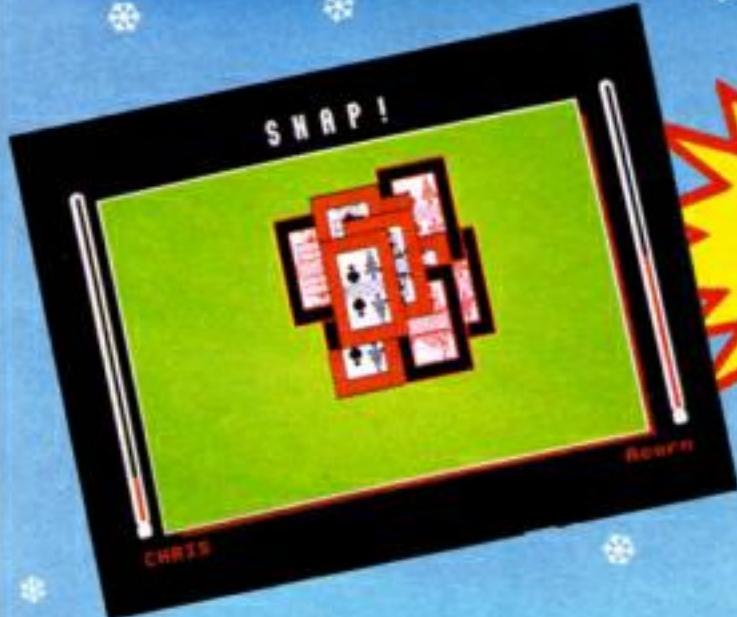
**Name the Carol.** Quick-fire answers win the game. Or you can just listen to the music.

**Candle Light.** A classic game updated in this "light the Christmas tree" challenge.

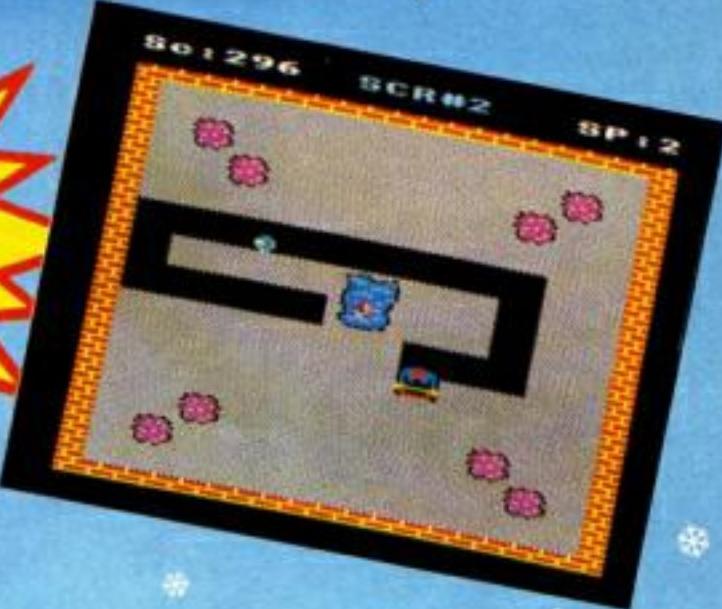
These are just the kind of crackers any Electron user would love to find in his Christmas stocking – packed with party games that make full use of the computer's power!

And all for just £6.95 on cassette.

It's the best buy you'll make this Christmas!



Put some sparkle into your Christmas!



TO ORDER TURN TO THE FORM ON PAGE 61

**HANDS** up all those who spotted my deliberate mistake last month.

Don't ask me why I said that 0,0 was at the top left of the screen instead of the bottom left as it really is. I just had a brainstorm and couldn't tell top from bottom (that was the week I went round with my socks on my head).

Anyway if you did spot it, well done. I'm glad someone was awake. And if you didn't, pay more attention in future.

Let's start by putting the Electron into a graphics mode with:

#### MODE 5

and then draw a line across the screen from bottom left to top right using:

DRAW 1279,1023

So far, so good. We're just using what we've dealt with up till now. Let's start anew with:

#### MODE 5

and enter:

VDU 29,640;512;

being very careful to ensure that you get the punctuation exactly right. If not, strange things will happen for which I take no responsibility. Now type in:

MOVE 0,0

and try and see what happens when you tell the micro to:

DRAW 1279,1023

You might have expected another diagonal line across the whole screen but that's not what you get. Instead there's a line from the middle of the display to the top right-hand corner. Why has this happened?

Obviously it's something to do with that VDU 29 command. What this does is to

# Moving around the screen with a VDU29

**Part ten of the Electron graphics series by TREVOR ROBERTS**

change the origin of the screen coordinates.

"Origin" is just a posh name for the point 0,0 which up till now has always been found at the bottom left corner of the screen. However by using VDU 29 in the format:

VDU 29,xorigin;yorigin;

you can move the origin to the point which previously had the coordinates *xorigin, yorigin*. In

the case of our earlier:

VDU 29,640;512;

this moves the origin to the centre of the screen. From now on graphics commands such as MOVE and DRAW will take this point as 0,0.

There's a point to note about VDU 29 (no pun intended). When it's issued it changes the origin but leaves the graphics cursor in the

same place.

In other words it doesn't automatically move the cursor from wherever it was before the VDU 29 to the new origin that's in force after that VDU 29.

Let's go back to the commands we issued to get our line from the centre to the top right. After the original:

#### MODE 5

the cursor was at 0,0 which, as

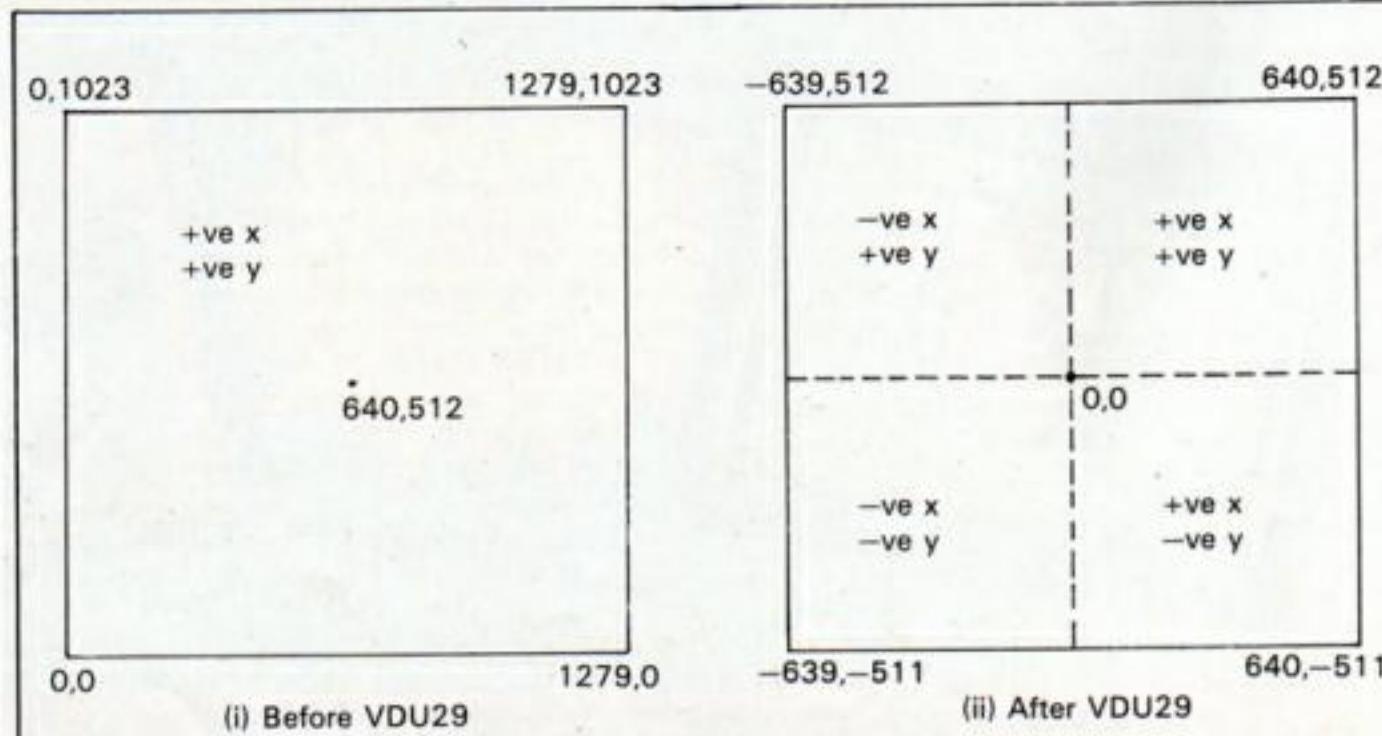


Figure 1: The effect on the screen coordinates of VDU29,640;512;

is normal, was at the bottom left of the screen. Now the following:

VDU 29,640;512;

moved the origin to the point that had coordinates 640,512. This will in future be known as point 0,0.

However the cursor was still lurking at the bottom left of the screen. It hadn't moved. Hence the need for:

MOVE 0,0

to shift it to the new origin before the:

DRAW 1279,1023

Try leaving out the MOVE and see what happens. Also try the following four DRAWS:

DRAW 640,512  
DRAW 640,-512  
DRAW -640,512  
DRAW -640,-512

not forgetting to MOVE back to 0,0 each time. Can you explain what's happening? Figure I should help.

Until now all our coordinates have been positive numbers. We could have tried to draw lines with commands such as:

DRAW -100,-100

and the Electron wouldn't have minded. But we wouldn't have seen the lines, they would lie off the display.

However, as soon as we move our origin to the centre of the screen (or anywhere on the screen apart from the bottom left) negative coordinates become a possibility, as the second part of Figure I illustrates.

Notice that the overall dimensions of the screen haven't changed. It's still 1280 graphics coordinates across and 1024 down. Only

now that we're measuring from the centre of the screen we use positive and negative values to determine the direction of our lines from the origin.

We could have done this before but it would have been a waste of time as we wouldn't have seen the lines — they'd be off the screen.

You'll see that after a VDU 29 has moved the origin to the centre:

MOVE 0,0  
DRAW 100,100

is greatly different from:

MOVE 0,0  
DRAW -100,100

or:

MOVE 0,0  
DRAW -100,-100

The lengths of the lines are the same, only the directions are

10 REM Program I  
20 MODE 5  
30 VDU 29,640;512;  
40 PROCaxes  
50 END  
60 DEF PROCaxes  
70 MOVE 0,-512  
80 DRAW 0,512  
90 MOVE -640,0  
100 DRAW 640,0  
110 MOVE 0,0  
120 ENDPROC

different.

Armed with this knowledge, Program I should cause no difficulties.

Line 30 moves the origin to the centre of the screen and once this is done the program calls PROCaxes. This then draws two lines across the screen effectively quartering it. These lines are the x axis (horizontal) and the y axis (vertical).

As it is, the screen's a bit blank. Can you label the axes? You'll probably need to use VDU 5 to do it.

Incidentally, you'll notice that in Program I I've used -512 and -640 rather than the values shown in Figure I, -511 and -639.

This is because I automatically think in terms of half 1280 and half 1024 when I'm dividing up the screen. As it is, this makes no difference. Can you see why?

When you've finished play-

10 REM Program II  
20 MODE 5  
30 VDU 29,640;512;  
40 PROClines  
50 END  
60 DEF PROClines  
70 MOVE 0,0  
80 FOR line=1 TO 20  
90 x=RND(1279)  
100 y=RND(1023)  
110 DRAW x,y  
120 MOVE 0,0  
130 NEXT line  
140 ENDPROC

Program I

Program II

ing round with Program I have a look at Program II, which attempts to draw 20 random lines.

You should have no problems seeing how it works. PROClines does the drawing, picking 20 pairs of random coordinates for the ends of the lines (line 120 ensuring that they always start at the origin.) The trouble is that all the lines are in the top right quarter of the screen.

Again, strain your brain to figure out why. And when you've had enough, run Pro-

10 REM Program III  
20 MODE 5  
30 VDU 29,640;512;  
40 PROClines  
50 END  
60 DEF PROClines  
70 MOVE 0,0  
80 FOR line=1 TO 20  
90 power=INT(RND(2))  
100 x=-1^power\*RND(640)  
110 y=-1^power\*RND(512)  
120 DRAW x,y  
130 MOVE 0,0  
140 NEXT line  
150 ENDPROC  
160 DEF PROClines  
170 MOVE 0,-512  
180 DRAW 0,512  
190 MOVE -640,0  
200 DRAW 640,0  
210 MOVE 0,0  
220 DRAW 0,0  
230 MOVE 0,0  
240 ENDPROC

Program III

gram III, which solves the problem using our previous two procedures and a simple bit of maths.

• And that's where we'll leave it for this month. There's more than enough in VDU 29 to keep you busy experimenting until next month, when we'll be going further along the right lines, graphically speaking.

**We use positive and negative numbers to determine the direction of our lines from the origin ,**





**AS well as being useful for quick and easy entry of data into programs, the Electron's function keys can also be an invaluable aid to programming.**

For example, it's often quite useful to set up one function key to list a program – with changed foreground and background colours if required, and perhaps another key to list the particular section of a program you are working on.

Also it's quite handy to set the Break key to run a program again.

There is one snag though. If you program a function key with a long sequence of commands and then later want to add or delete a command, you have to type the whole lot in again.

Also, if you have defined a large number of keys it's easy to lose track of which key does what.

Now these problems are

solved with Program I, Function Key Lister.

What it does is to assemble and save a machine code program called *FLIST* which will list all function key definitions in exactly the same way as they would be typed in.

This means that you can copy and edit a particular function key's definition in much the same way you would a program line.

As you may know, the function key definitions are stored in page &B (&B00 to &BFF), the first 16 bytes of which point to the start of each key's definition.

There is no pointer to the end of a definition, so if you need to know its length you must find the start of the next definition which is the end of the definition you are checking.

One thing to remember when using function keys is that codes less than 32 or

# Keep track of those function keys

***ROBIN NIXON presents a way to make the most of these invaluable aids to program development***

greater than 127 must be represented by control sequences.

For example, if you want to enter the code for carriage return (CHR\$13) you have to type !M. The ! stands for control and M is the 13th letter of the alphabet.

If you want to enter the code 129 you should type :!A. Again : is control, the !, although it is CHR\$33, when following a : is treated as CHR\$128.

And finally the :A, control A, is CHR\$1 which, when added to 128 gives us CHR\$129.

However if you typed :IA this would mean CHR\$193, which is 128+65. This is because the A is not preceded by a ! and is therefore not a control character. Thus the Ascii value of A, 65, is added to 128.

Usually these control sequences are used by BBC Micro users to insert teletext

control characters into a function key for colourful Mode 7 displays.

But they are equally useful for displaying user-defined characters or entering special codes, other than alphanumeric ones, into programs.

However as Program I assembles into the user-defined character area you will have to assemble the program elsewhere if you wish to use them. You can do this by changing the value of P% in line 260.

I'll leave you with the set of function key definitions I most often use:

```
#KEY 0 MODE 6!MINLIST!M
#KEY 1 RUN!M
#KEY 2 CALL &COBOL!M
#KEY10 OLDDIM=FX11,20!M+FX12
,2!MMODE 6!MLIST!N!M
```

## Function Key listing

### From Page 23

100 REM *****	620 .notgreater	1860 LDA #32	1500 \
110 REM *	630 \	1870 JSR oswrch	1510 .nodef
120 REM * Function Key *	640 INX	1880 LDX #78	1520 \
130 REM * Lister *	650 CPX #16	1890 \	1530 INY
140 REM *	660 BNE loop2	1100 .pstring	1540 CPY #16
150 REM * By R.Nixon *	670 LDA #71	1110 \	1550 BEQ quit
160 REM *	680 CMP #FF	1120 LDA &B81,X	1560 JMP loop1
170 REM * (c) Electron *	690 BEQ nodef	1130 CMP #128	1570 \
180 REM * User *	700 JSR osnewl	1140 BCC smaller	1580 .quit
190 REM *	710 LDA #32	1150 JMP toobig	1590 \
200 REM *****	720 JSR oswrch	1160 \	1600 JSR osnewl
210 REM	730 LDX #8	1170 .smaller	1610 RTS
220 MODE6	740 \	1180 \	1620 \
230 oswrch=&FFEE	750 .printloop1	1190 CMP #32	1630 .greater
240 osnewl=&FFE7	760 \	1200 BCC toosmall	1640 \
250 FOR PASS=0 TO 3 STEP3	770 LDA keymess,X	1210 \	1650 CMP #71
260 PI=&C88	780 BEQ pdone	1220 .pbyte	1660 BCC less
270 [	790 JSR oswrch	1230 \	1670 JMP notgreater
280 OPT PASS	800 INX	1240 JSR oswrch	1680 \
290 \	810 JMP printloop1	1250 INX	1690 .less
300 .start			1700 \
310 \			1710 STA #71
320 LDY #8			1720 JMP notgreater
330 \			1730 \
340 .ptitle			1740 .keymess
350 \			1750 \
360 LDA title,Y			1760 EQUUS "*KEY"
370 BEQ loopinit	820 \	1260 CPX #71	1770 EQUUB 8
380 JSR oswrch	830 .pdone	1270 BNE pstring	1780 \
390 INY	840 \	1280 JMP nodef	1790 .title
400 JMP ptitle	850 TYA	1290 \	1800 \
410 \	860 CMP #18	1300 .toobig	1810 EQUUB 22
420 .loopinit	870 BCS notsingle	1310 \	1820 EQUUB 6
430 \	880 LDA #32	1320 PHA	1830 EQUUB 31
440 LDY #8	890 JSR oswrch	1330 LDA #124	1840 EQUUB 11
450 \	900 TYA	1340 JSR oswrch	1850 EQUUB 1
460 .loop1	910 JMP single	1350 LDA #33	1860 EQUUS "Function Key Li
470 \	920 \	1360 JSR oswrch	ster"
480 LDA &B88,Y	930 .notsingle	1370 PLA	1870 EQUUB 31
490 STA #78	940 \	1380 AND #7F	1880 EQUUB 12
500 LDA #FF	950 LDA #49	1390 JMP smaller	1890 EQUUB 2
510 STA #71	960 JSR oswrch	1400 \	1900 EQUUS "(c) Electron Us
520 LDX #8	970 TYA	1410 .toosmall	er"
530 \	980 SEC	1420 \	1910 EQUUB 10
540 .loop2	990 SBC #18	1430 PHA	1920 EQUUB 8
550 \	1000 \	1440 LDA #124	1930 ]
560 LDA &B88,X	1010 .single	1450 JSR oswrch	1940 NEXT
570 CMP #78	1020 \	1460 PLA	1950 OSCLI ("*SAVE FLIST "
580 BCC notgreater	1030 CLC	1470 CLC	+STR\$"start" "+STR\$"PI")
590 BEQ notgreater	1040 ADC #48	1480 ADC #64	
600 JMP greater	1050 JSR oswrch	1490 JMP pbyte	
610 \			



This listing is included in  
this month's cassette  
tape offer. See order  
form on Page 61.



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ever had to  
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The year is 1943. As an RAF officer stranded in Occupied France you have one aim — to get back to Britain.

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Even the simplest tasks — from buying food to taking buses — place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you ...

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

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And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

**For teachers:** French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.

DATABASE SOFTWARE

TO ORDER TURN TO THE FORM ON PAGE 61

# SANTA'S SLEIGH



CHRISTMAS is here once more and Santa is getting ready to deliver all his presents. The sleigh is waiting and all he needs to do is load up the goodies.

Rudolf has been put out to pasture and the sleigh is now gas powered. It's a bit of a fuel guzzler so take it easy and keep an eye on the fuel gauge.

The presents have been stolen and scattered throughout a warehouse, so you guide Santa round on his sleigh and pick them all up.

When you have collected all the presents in one room you can move on to the next through the exit at the bottom of the screen.

This is by no means an easy task since many dangers lurk deep within the warehouse.

Watch out for the large spider descending on its thread and dodge the Christmas crackers bouncing up and down.

**CONTROLS**  
Return = thrust  
Z = left  
X = right

## VARIABLES

stage% Screen.  
live% Number of lives left.  
score% Score.  
FUEL% Amount of fuel left.  
walk% Whether you have landed.  
X%, Y% Santa's coordinates.  
HI%() High scores.  
HI\$() High score names.

Full listing starts  
on Page 30

## Santa's Sleigh listing

### From Page 29

10 REM Santa's Sleigh  
20 REM By Andrew Waite  
30 REM (c) Electron User  
40 MODE 6  
50 PROCinit  
60 VDU 19,1,2;0;23,1,0;0  
;0;0;  
70 COLOUR129:COLOUR0:PRI

NT" Santa's Sleigh.....  
y Andrew Waite :COLOUR12  
8:COLOUR1

80 PRINT "Someone has sto  
len Santa's presents and hi  
dden them in an old warehou  
se. It is guarded by a gru  
esome spider and two gri  
sly bouncers."

90 PRINT "Santa can land  
on the brick floors but w  
atch out for the spikes and  
don't crashland too quickl  
y! Santa's sleigh has a li  
mited supply of fuel so be  
careful."

100 PRINT "After collecti  
ng all the presents in ther  
com move on to the next thr  
ough the tunnel at the b  
ottom of the screen."

110 PRINT "Z=LEFT X=RIG  
HT RETURN=THRUST" "Or use  
a PLUS 1 joystick"

120 PRINT "Do you want so  
und in the game Y/N?"

130 REPEAT

140 B\$=GET\$  
150 UNTIL B\$="Y" OR B\$="N"

160 IF B\$="N" THEN FX 21  
8,1

170 IF B\$="Y" THEN FX 21  
8,0

180 PRINT "Press \*\*J\*\* fo  
r PLUS 1 joysticks" "or \*\*K  
\*\* for Keyboard control to  
start"

190 REPEAT

200 B\$=GET\$

210 UNTIL B\$="K" OR B\$="J"

220 REPEAT

230 liveZ=4:scoreZ=0

240 stageZ=1:tresZ=0

250 ex1% =FALSE

260 RESTORE 2450

270 FOR NZ=1 TO 8  
280 READ txZ(NZ),tyZ(NZ)  
290 NEXT  
300 REPEAT  
310 MODE 5  
320 VDU 23,1,0;0;0;  
330 COLOUR 129  
340 FOR NI=8 TO 29  
350 PRINT TAB(0,NZ);CHR\$2  
24;TAB(19,NZ);CHR\$224  
360 NEXT  
370 COLOUR 128:COLOUR 1  
380 PRINT TAB(2,27);"0000  
8"  
390 PRINT TAB(7-LEN STR\$(  
scoreZ),27);scoreZ  
400 PRINT TAB(15,29);stag  
eZ  
410 PRINT TAB(4,29);liveZ  
420 COLOUR 3  
430 PRINT TAB(2,26);"SCOR  
E"  
440 PRINT TAB(14,26);"FUE  
L"  
450 PRINT TAB(13,28);"SCR  
EEN"  
460 PRINT TAB(2,28);"LIVE  
S"  
470 RESTORE 2410  
480 FOR NZ=1 TO 56  
490 READ XZ,YZ,WZ,VZ  
500 IF VZ=224 COLOUR 129:  
COLOUR 3  
510 IF VZ=225 COLOUR 128:  
COLOUR 3  
520 IF VZ=234 COLOUR 128:  
COLOUR 2  
530 IF VZ=235 COLOUR 128:  
COLOUR 1  
540 PRINT TAB(XZ,YZ);STRI  
NG\$(WZ,CHR\$VZ);  
550 NEXT  
560 VDU 5  
570 RESTORE 2460  
580 FOR NZ=1 TO 8  
590 READ XZ,YZ  
600 IF txZ(NZ)=0 THEN 630  
610 GCOL 0,1:MOVE XZ+64,(  
32-YZ)\*32:VDU250  
620 GCOL 0,2:MOVE XZ+64,(  
32-YZ)\*32:VDU251  
630 NEXT  
640 B\$=CHR\$240+CHR\$241  
650 S\$=CHR\$228+CHR\$229  
660 S1\$=CHR\$238+CHR\$231  
670 syZ=10:suZ=FALSE  
680 byZ=3:upZ=TRUE  
690 XZ=628:YZ=200  
700 FUELZ=200  
710 charZ=226:char2Z=227  
720 newZ=0:outZ=TRUE  
730 SPEEDI=0:walkZ=FALSE  
740 GCOL 3,1:MOVE XZ,YZ  
750 PRINT CHR\$226  
760 COLOUR 128:COLOUR 1  
770 IF B\$="K" PROCkey ELS  
E PROCjoy  
780 UNTIL liveZ=0  
790 FORMZ=1 TO 10  
800 FORMZ=1 TO 2000:NEXT  
810 PRINT TAB(4+NZ,15);MI  
D\$("GAME OVER",NZ,1)  
820 NEXT  
830 FORMZ=1 TO 10000:NEXT  
840 FOR NZ=10 TO 1 STEP -  
1  
850 IF scoreZ>HIZ(NZ) HIZ  
(NZ)=HIZ(NZ-1):HI\$(NZ)=HI\$(  
NZ-1):newZ=NZ  
860 NEXT  
870 MODE 6:PROChi  
880 UNTIL FALSE  
890 :  
900 DEF PROCinit  
910 VDU 23,224,255,16,16,  
16,255,1,1,1  
920 VDU 23,225,0,0,0,0,  
0,0,255  
930 VDU23,226,48,112,120,  
176,58,57,127,126  
940 VDU23,227,12,14,38,13  
,92,156,254,126  
950 VDU23,228,135,127,57,  
123,255,52,84,147  
960 VDU23,229,225,254,156  
,222,255,44,42,281  
970 VDU23,230,1,1,1,1,1,1  
,1,1  
980 VDU23,231,128,128,128  
,128,128,128,128  
990 VDU 23,234,129,66,36,  
24,24,36,66,129  
1000 VDU 23,235,0,0,0,0,  
28,62,127  
1010 VDU23,240,247,119,255  
,127,255,127,247,119  
1020 VDU23,241,238,239,254  
,255,254,255,238,239  
1030 VDU23,250,231,231,231  
,0,0,231,231,231  
1040 VDU23,251,24,24,24,25  
5,255,24,24,24  
1050 DIM txZ(8),tyZ(8)  
1060 DIM HI\$(10),HIZ(10)  
1070 FOR NZ=1 TO 10  
1080 HI\$(NZ)="Electron"  
1090 HIZ(NZ)=1100-(100+NZ)  
1100 NEXT  
1110 ENDPROC  
1120 :  
1130 DEF PROCkey  
1140 REPEAT  
1150 IF INKEY(-98) L\$=TRUE  
ELSE L\$=FALSE  
1160 IF INKEY(-67) RI=TRUE  
ELSE RI=FALSE  
1170 IF INKEY(-74) FI=TRUE  
ELSE FI=FALSE  
1180 PROCgame  
1190 UNTIL outZ=FALSE  
1200 ENDPROC  
'210 :  
1220 DEF PROCjoy  
1230 REPEAT  
1240 joyZ=ADVAL(1)  
1250 butZ=ADVAL(0) AND 3  
1260 IF joyZ>&D800 L\$=TRUE  
ELSE L\$=FALSE  
1270 IF joyZ<&2000 RI=TRUE  
ELSE RI=FALSE  
1280 IF butZ=1 THEN FI=TRUE  
ELSE FI=FALSE  
1290 PROCgame  
1300 UNTIL outZ=FALSE  
1310 ENDPROC  
1320 :  
1330 DEF PROCgame  
1340 GCOL 3,1:X1Z=XZ:Y1Z=Y  
Z:char2Z=charZ  
1350 IF L\$=TRUE XZ=XZ-8:ch  
arZ=227 ELSE IF RI=TRUE XZ=  
XZ+8:charZ=226  
1360 IF FI=TRUE AND FUELZ>  
0 SPEEDI=SPEEDI+2:FUELZ=FUE  
LZ-1:SOUND &10,-15,5,7  
1370 YZ=YZ+SPEEDI:IF walkZ  
=FALSE SPEEDI=SPEEDI-1  
1380 MOVE XZ,YZ:PRINT CHR\$  
(charZ):MOVE X1Z,Y1Z:PRINT  
CHR\$(char2Z)  
1390 VDU 4:IF stageZ>1 PRO  
Cspider:IF stageZ>2 PROCbou  
ncer

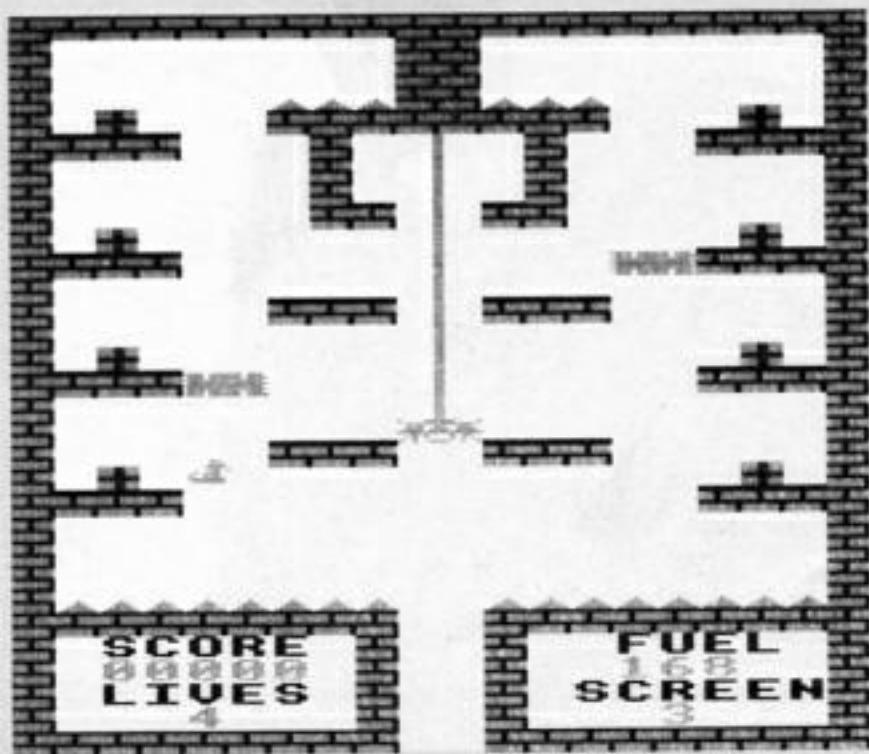
This is one of hundreds of  
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**MicroLink**

```

1400 PRINT TAB(14,27);FUEL
1;":VDU 5
1410 AX=POINT(XI,YI):BI=PO
INT(XI+56,YI):CI=POINT(XI,Y
I-32):DI=POINT(XI+56,YI-32)
1420 IF (CI=3 OR DI=3) AND
SPEEDI>9 SPEEDI=8:walkI=T
RUE ELSE walkI=FALSE
1430 IF walkI=TRUE AND AX=
8 AND BI=8 ENDPROC
1440 IF AX=8 AND BI=8 AND
CI=8 AND DI=8 ENDPROC
1450 IF CI=-1 AND tresI=8
PROCend:outI=FALSE:ENDPROC
1460 atresI=tresI:PROCtrea
sure:IF (atresI+1)=tresI EN
DPROC
1470 PROCeplode:outI=FALS
E:ENDPROC
1480 :
1490 DEF PROCtreasure
1500 RESTORE 2460
1510 FOR NI=1 TO 8:READ px
I,pyI
1520 IF ((NI<5 AND XI<txI
(NI)) OR (NI>4 AND XI+40)>t
xI(NI)) AND (tyI(NI)-8<YI
AND tyI(NI)+36>YI) PROCscor
e
1530 NEXT
1540 ENDPROC
1550 :
1560 DEF PROCscore
1570 VDU 4
1580 COLOUR 3
1590 PRINT TAB(pxI,pyI);CH
R$225;TAB(pxI,pyI-1);"
1600 COLOUR 1
1610 scoreI=scoreI+100
1620 tresI=tresI+1
1630 txI(NI)=8:tyI(NI)=8
1640 SOUND 1,-15,100,5
1650 PRINT TAB(7-LEN STR$(scoreI),27);scoreI
1660 IF scoreI>1999 AND ex
I=FALSE liveI=liveI+1:FOR
NI=1 TO 3:SOUND 1,-15,200,5
:SOUND 1,8,8,5:NEXT:exI=TR
UE:PRINT TAB(4,29);liveI
1670 VDU 5
1680 SPEEDI=8
1690 GCOL8,1
1700 MOVEXI,YI
1710 PRINTCHR$charI
1720 GCOL3,1
1730 ENDPROC
1740 :
1750 DEF PROCend
1760 VDU 4
1770 REPEAT
1780 IF FUELI>4 scoreI=sco
reI+4:FUELI=FUELI-4 ELSE sc
oreI=scoreI+FUELI:FUELI=8
1790 PRINT TAB(7-LEN STR$(scoreI),27);scoreI
1800 PRINT TAB(14,27);FUEL
I;"
1810 SOUND &11,-15,200-FUE
LI,1
1820 UNTIL FUELI=8
1830 +FI 15,1
1840 RESTORE 2450
1850 FOR NI=1 TO 8
1860 READ txI(NI),tyI(NI)
1870 NEXT
1880 tresI=8
1890 CLS
1900 PRINT'"Move on to fi
nd""more presents..."'
1910 FOR NI=1 TO 10000:NEX
T
1920 stageI=stageI+1
1930 VDU 5
1940 ENDPROC
1950 :
1960 DEF PROCspider
1970 IF suI=TRUE PRINT TAB
(9,SYI DIV 2);":SYI=SYI-
1 ELSE PRINT TAB(9,SYI DIV 2
);SI$:SYI=SYI+1
1980 PRINT TAB(9,SYI DIV 2
);$S
1990 IF SYI>50 SUI=TRUE EL
SE IF SYI<12 THEN SUI=FA
LSE
2000 ENDPROC
2010 :
2020 DEF PROCbouncer
2030 PRINT TAB(4,byI);"
;TAB(14,25-byI);"
2040 IF byI<3 upI=FALSE EL
SE IF byI>22 upI=TRUE
2050 IF upI=TRUE byI=byI-
1 ELSE byI=byI+1
2060 PRINT TAB(4,byI);B$;1
AB(14,25-byI);B$
2070 ENDPROC
2080 :
2090 DEF PROCeplode
2100 liveI=liveI-1
2110 VDU 4
2120 GCOL 8,3
2130 SOUND &10,-15,6,40
2140 FOR NI=1 TO 20
2150 MOVE XI+20,YI-20
2160 DRAW XI+RND(100)-RND(
50),YI+RND(100)
2170 NEXT
2180 FOR NI=1 TO 10000:NEXT
2190 ENDPROC
2200 :
2210 DEF PROChi
2220 VDU 19,1,3;0;23,1,0;0
;0;0;
2230 HI$(newI)=STRING$(30,
".")
2240 +FI 15,1
2250 HI$(newI)=scoreI
2260 IF newI<>0 PROCprinthi
:PRINT TAB(7,22);"Please e
nter your name":INPUT TAB(3
,1+(2*newI));HI$(newI)
2270 PROCprinthi
2280 PRINT TAB(4,23);"Pres
s <SPACE> for a new game"
2290 REPEAT UNTIL GET=32
2300 ENDPROC
2310 :
2320 DEF PROCprinthi
2330 CLS
2340 PRINT TAB(10);"TODAYS
HI SCORES":TAB(10);"-----
-----"
2350 FOR NI=1 TO 10
2360 PRINT";NI;STRING$(3
-LEN STR$(NI),"");HI$(NI)
;STRING$(30-LEN HI$(NI),".")
;HI$(NI)
2370 NEXT
2380 IF newI=0 PRINT TAB(7
,22);" Your score was ";sco
rei
2390 ENDPROC
2400 :
2410 DATA 8,8,224,8,38,
9,224,11,38,9,224,1,25,8,22
4,11,25,8,224,8,26,1,224,8,
27,1,224,8,28,1,224,8,29,1,
224,11,26,1,224,11,27,1,224
,11,28,1,224,11,29,1,224,6,
4,8,224,7,8,2,224,7,12,2,22
4,7,5,1,224,7,6,1,224,7,7,1
,224,12,5,1,224
2420 DATA 12,6,1,224,12,7,
1,224,11,8,2,224,1,5,3,224,
1,18,3,224,1,15,3,224,1,28,
3,224,16,5,3,224,16,18,3,22
4,16,15,3,224,16,28,3,224,6
,12,3,224,6,18,3,224,11,12,
3,224,11,18,3,224,9,1,2,224
,9,2,2,224,9,3,2,224
2430 DATA 6,17,3,225,11,17
,3,225,1,4,3,225,1,9,3,225,
1,14,3,225,1,19,3,225,16,4,
3,225,16,9,3,225,16,14,3,22
5,16,19,3,225,6,11,3,225,11
,11,3,225,1,24,8,235,11,24,
8,235
2440 DATA 6,3,3,235,11,3,3
,235,8,7,1,225,11,7,1,225
2450 DATA 196,896,196,736,
196,578,196,418,1052,896,10
52,736,1052,578,1052,418
2460 DATA 2,4,2,9,2,14,2,1
9,17,4,17,9,17,14,17,19

```



This listing is included in  
this month's cassette  
tape offer. See order  
form on Page 61.

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

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**TO ORDER TURN TO THE FORM ON PAGE 61**

**YIPPEE!** It's Christmas morning and Santa has left lots of presents for you hanging on the tree. But before you can have them you must guess a hidden word.

At the bottom of the screen you'll see a row of dots, one for each letter in the word. Press a letter to make a guess and if you are right it will be entered into the correct position.

However if you are wrong one of your presents will be taken off the tree.

Can you guess the word or will you lose all your presents? It's up to you!

**Yule Spell** is a seasonal variation on that old classic Hangman and is great fun for all the family.

There are about 160 words and I have included as many seasonal ones as I can. You can easily add your own by tagging them on to the end of one of the data statements starting at line 800.

There is a short delay when the program is run as it draws the title page.

Plus 3 users should save the program before running it since it switches off the ADFS and downloads to &E00.

### PROCEDURES

lost	Erases the fairy.
escape	Ends the game.
space	Waits for the spacebar to be pressed.
dunnit	Congratulates player.
tune	Plays Jingle Bells.
present	Draws each present.
fairy	Draws the fairy.
flakes	Draws the snowflakes.

# YULE SPELL

By  
**KEITH TRANGMAR**



### VARIABLES

C%	The letter chosen.
B%	Position of the letter in the word.
F%	True if the letter appears more than once.
M%	The number of words.
S%	The number of letters guessed.
T%	The number of guesses.
A\$	The word.



```

10 REM ** Yule Spell **
20 REM * By K.Trangmar *
30 REM (c) Electron User
40 +FX14,6
50 IF PAGE>&E00 GOTO950
60 MODE2:VDU23,1,0;0;0;0
70 VDU19,15,7;0;17,15:PR
80 C$now:PROCyule:PROCdbl("Pr
ess SPACE to play.",-1,29):
REPEAT:PROCtune:PROCflakes:
UNTIL INKEY(8)=32
90 REM Find number of wo
rds available
90 RESTORE800:M%=true:RE
PEAT:READA$:M%=M%+1:UNTILA$=
" "
100 REM Set up title page
110 ON ERROR PROCescape

```

## *Yule Spell listing*

*From Page 33*

```

128 ENVELOPE1,18,-5,8,8,5
8,8,8,126,8,8,-126,126,126
138 ENVELOPE2,18,7,8,8,75
,8,8,126,8,8,-126,126,126
148 SOUND&11,2,158,18:PRO
Ctree
158 REM Select word
168 TX=-1:RESTORE8000:FOR
AX=1 TO RND(MX):READ A$:NEXT
T:B$=A$:S%:B%:FOR AX=BT09:P%
(A%)=TRUE:NEXT:W%=B%
178 FORAX=BT025:AI?&900=0
:NEXT:L%:L%=(LEN(A$)DIV2):*F
X13,6
188 VDU17,128,17,7:FORW%=
1TOLEN(A$):IFMID$(B%,W%,1)=
".,"THENPROCdbl(MID$(A%,W%,1
),L%+W%,29)ELSEPROCdbl(".",
L%+W%,29)
198 NEXT:OSCLI"FX21":*FX1
15
208 PRINTTAB(2,8);"Next"
" Choice: ";:VDU127,23,1,1;
0;0;0;
218 REPEAT:C%:INKEY(0):UNTIL
C%>64 AND C%<91 AND C%?
&8BF=0:C%?&8BF=255:VDUC%,23
,1,0;0;0;0;17,132,17,3
228 FX=FALSE:IF C%=90 THE
NVDU31,3,25,90 ELSEVDU31,((C%
-65) MOD5)+1,((C%-65) DIV
5)+20,C%
238 VDU29,-32;0::BX=INSTR
(B$,CHR%C%):IF BX=8 GOT0278
248 S%:S%+1:IF S%=LEN(A$)
PROCdunnnit:GOT0148 ELSESOU
ND&11,2,188,18
258 B$=LEFT$(B$,BX-1)+"."
+RIGHT$(B$,LEN(B$)-BX)
268 FX=TRUE:GOT0238
278 PROCdraw:IF TX=18 GOT
0148 ELSE 188
288 REM Erase presents
298 DEFPROCdraw:IF FX=FAL
SE TX=TX+1 ELSEENDPROC
308 IF TX<18 SOUND&11,1,1
88,18 ELSEPROClost:ENDPROC
318 REPEAT:D%:RND(18)-1:UNTIL
P%(D%)=TRUE
328 P%(D%)=FALSE:AX=D% DI
V2:IF D% MOD2=0 MOVE488+58+
AX,238+125*AX ELSEMOVE1198-
58*AX,238+125*AX
338 VDU5,18,2,0,11,11,128
,128,8,8,18,128,128,4:ENDPR
OC
348 REM No presents left
358 DEFPROClost:OSCLI"FX1

```

```

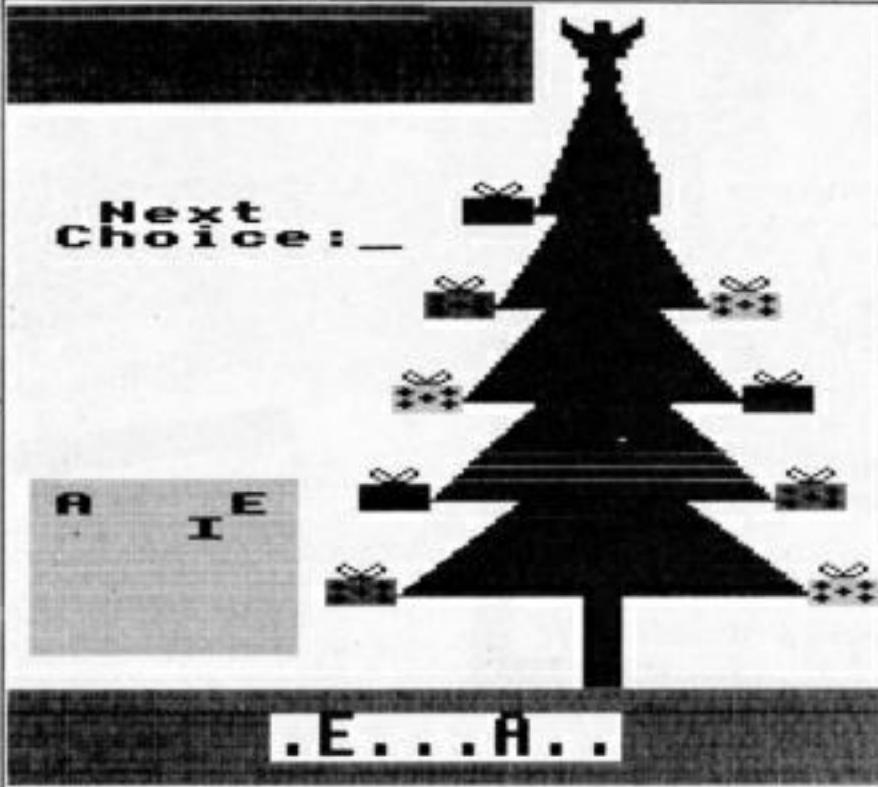
4,6*:SOUND&11,1,100,20:MOVE
840,1016:VDU5,18,2,0,128,12
8,8,8,10,128,128,8,8,10,128
,128,4:VDU28,0,26,8,19,17,1
28,12,26,17,129,17,7:PROCdb
1("Tough luck",0,1):VDU17,1
32,17,3:PROCdbl1("You didn't
make it !",-1,24)
360 VDU28,0,27,19,26,12,2
6:PROCdbl1("The word was",3,
26):VDU28,0,31,19,28,17,11,
17,148,12,26:PROCdbl1(A$,LX+
1,29):PROCsphere:ENDPROC
370 DEFPROCescape:OSCLI" F
X14,6*:SOUND&11,1,100,20:VD
U17,129,17,7:PROCdbl1(" Quit
ter ",0,1):VDU28,0,26,8,19
,17,128,12,26,17,132,17,3:6
OT0360
380 DEFPROCsphere:VDU31,2,
7,17,7,17,128:PRINT;"Press"
'" SPACE"" to Play "" a
gain":REPEAT UNTIL INKEY(-9
9):ENDPROC
NI=255 RESTORE438:READ NZ
420 IF NZ=0 SOUND&11,0,0,
0:ENDPROC ELSE SOUND&11,-1,
NZ,15:ENDPROC
430 DATA96,0,96,0,96,96,0
,96,0,96,0,96,96,0,96,0,100
,0,88,0,88,0,96,96,96,0,0,1
00,0,100,0,100,100,0,100,96
,0,96,0,96,96,0,96,96,0,88,
0,88,0,96,0,88,88,88,0,100,
100,0,0
440 DATA96,0,96,0,96,96,0
,96,0,96,0,96,96,0,96,0,100
,0,88,0,88,0,96,96,96,0,0,1
00,0,100,0,100,100,0,100,96
,0,96,0,96,0,96,100,0,100,0
,96,0,88,0,88,88,88,0,88,88,0
,0,0,0,0,255
450 DEFPROCtree
460 VDU23,128,0,4,18,9,4,
3,0,0,23,129,0,16,48,72,144
,224,0,0
470 VDU23,130,0,0,0,0,0,0,0
,63,63,23,131,0,0,0,0,0,0,0,2

```

```

925,128:PLOT85,875,250:PLOT
85,925,250:VDU5
    530 FOR A% = 0 TO 4:6COL0,2
    :MOVE 600+50*A%,250+125*A%:
MOVE 1200-50*A%,250+125*A%:
PLOT85,900,450+125*A%:MOVE4
80+50*A%,230+125*A%:PROCpresent:
MOVE1190-50*A%,230+125
*A%:PROCpresent:NEXT
    540 PROCfairy:VDU4:OSCLI*
FX20*:ENDPROC
    550 DEFPROCpresent
    560 IF R% = 1 THEN R% = 4 ELSE
E IF R% = 4 THEN R% = 5 ELSE R%
=1
    570 VDU11,11,18,0,6,128,1
29,0,0,18,0,R%,130,131,0,0,
10,132,133,0,0,11,18,0,3,13
4,135,0,0,10,136,137
    580 ENDPROC
    590 DEFPROCfairy
    600 VDU23,128,0,0,0,128,1
28,192,224,240,23,129,0,0,0
,2,2,6,14,30
    610 VDU23,130,0,0,0,0,3,0
,0,0,23,131,0,0,0,0,128,0,0
,0
    620 VDU23,132,240,128,40

```



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```

288 REM Erase presents
290 DEFPROCdraw:IF FX% = FALSE
SE TX% = TX% + 1 ELSE ENDPROC
300 IF TX% < 10 SOUND&11,1,1
00,10 ELSE PROClust:ENDPROC
310 REPEAT:DX% = RND(10) - 1:U
NTIL PX(DX%) = TRUE
320 PX(DX%) = FALSE:AX% = DX DI
V2:IF DX% MOD 2 = 0 MOVE480+50+
AX%,230+125*AX% ELSE MOVE1190-
50*AX%,230+125*AX%
330 VDU5,18,2,0,11,11,128
,128,8,8,10,128,128,4:ENDPR
OC
340 REM No presents left
350 DEFPROCclust:OSCLI"FX1

```

```

398 DEFPROCdununit:OSCLI"F
X14,6":VDU17,129,17,7:PROCd
bl("Well done!",B,1):VDU17,
128:PROCdbl(A$,L%+1,29):SOU
ND1,2,58,28:PROCsphere:ENDPR
OC

408 DEFPROCdbl(Q$,P%,Q%):
FORIX=1TOLEN(Q$):?&78=ASC(M
ID$(Q$,IX,1)):AI=18:XI=&78:
YI=0:CALL &FFF1:VDU23,253,?
&71,?&71,?&72,?&72,?&73,?&7
3,?&74,?&74,23,254,?&75,?&7
5,?&76,?&76,?&77,?&77,?&78,
?&78,31,P%+IX,Q%,253,18,0,2
54:NEXT:ENDPROC

418 DEFPROCTune:READNI:IF

```

```

48,32,8,8,8,23,133,62,68,24
,24,8,8,8,8
 638 VDU23,134,8,8,8,8,8,8
,8,24,23,135,8,8,8,8,8,8,8,8,
48
 648 VDU23,136,8,8,8,8,8,3
,3,3,23,137,8,8,8,8,8,128,1
28,128
 658 VDU23,138,7,7,15,15,3
1,31,31,7,23,139,192,192,22
4,224,248,248,248,192
 668 VDU23,148,7,7,7,7,15,
15,15,15,23,141,192,192,192
,192,224,224,224,224
 678 MOVEB$48,1016
 688 VDU5,18,8,7,136,137,8
,8,18,8,6,138,131,8,8,18,8,
3,128,129,8,8,18,132,133,8,
8,18,8,6,138,139,8,8,18,148
,141,8,8,11,18,8,7,134,135
 698 VDU23,128,255,255,255
,255,255,255,255,255
 708 ENDPROC
 718 DEFPROC$snow
 728 PROCdb1 ("One moment p

```

lease.\*,8,29)  
 738 FORV% = 2T014: VDU19,V%,  
 0;0;:NEXT  
 748 FORX% = 8T0159STEP8:CX =  
 RND(14):6COL0,1:MOVE8+XX,16  
 :DRAM64+8\*XX,16:MOVE8+XX,11  
 2:DRAM64+8\*XX,112:FORY% = 255  
 TD28STEP-4  
 758 CI=CI+1:IF CI=15 CI=2  
 768 6COL0,CX: PLOT69,32+8\*  
 XX,4\*Y%:NEXT,:ENDPROC  
 778 DEFPARAMETER flakes: VDU19,C  
 %,8;0;:CI=CI+1:IF CI=15 CI=  
 2  
 788 VDU19,CX,7;0;:ENDPROC  
 798 REM Christmas words  
 808 DATATREE, HOLLY, IVY, SN  
 OW, SANTA, ANGEL, BELLS, FAIRY,  
 ROBIN, STAR, CHOIR, NOEL, YULE,  
 FIRE, PAPER, PARTY, CREAM, MERR  
 Y, CHEER  
 818 DATA CRACKER, BAUBEL, SN  
 OMAN, JINGLE, LANTERN, PUDDIN  
 G, CANDLE, SLEIGH, DONKEY, MANG  
 ER, RUDOLF, SHERRY, BRANDY, TUR

KEY, LIGHTS, ICICLE, TINSEL, PA  
 RCEL  
 828 DATA PRESENTS, MISTLETO  
 E, REINDEER, NATIVITY, STOCKIN  
 G, FESTIVITIES, SHEPHERDS, SNO  
 WFLAKE, CELEBRATION, DECEMBER  
 838 REM Other words  
 848 DATA CAMEL, EQUAL, CRANE  
 , EMPTY, SPICE, FEAST, GOOSE, GR  
 EED, HEART, HIPPO, FLAME, JOKER  
 , JUICE, KNIFE, KNOCK, LARGE, LA  
 UGH, LEAST, MATCH, MEDAL, MOOSE  
 , NIGHT, NOVEL, QUEEN, RADIO, RO  
 UND, SERVE, SHAKE, SMALL, VICAR  
 , WHALE, YOUNG  
 858 DATA ANCHOR, ARRIVE, BOT  
 TLE, CASTLE, COPPER, DINNER, EA  
 STER, GARDEN, GINGER, MAGNET, N  
 EPHEW, NATURE, ORANGE, PANTRY,  
 PEOPLE, PERSON, RACKET, SACRED  
 , YELLOW, WINTER  
 868 DATA BOURBON, CLIMATE, C  
 ONTEST, DELIVER, DISTANT, FORT  
 UNE, GLIMPSE, HEALTHY, HOLIDAY  
 KINGDOM, MERMAID, MILLION, OC

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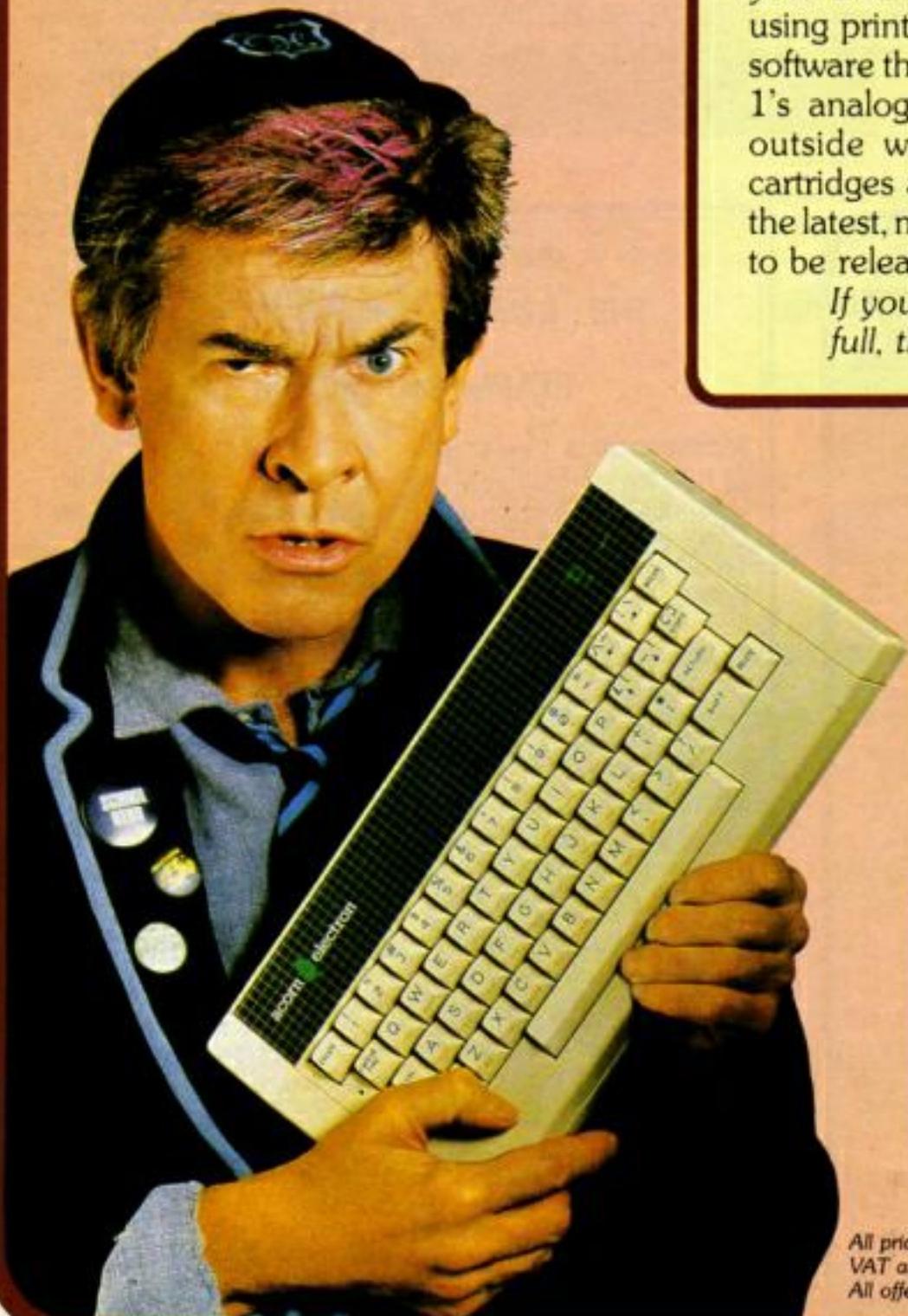
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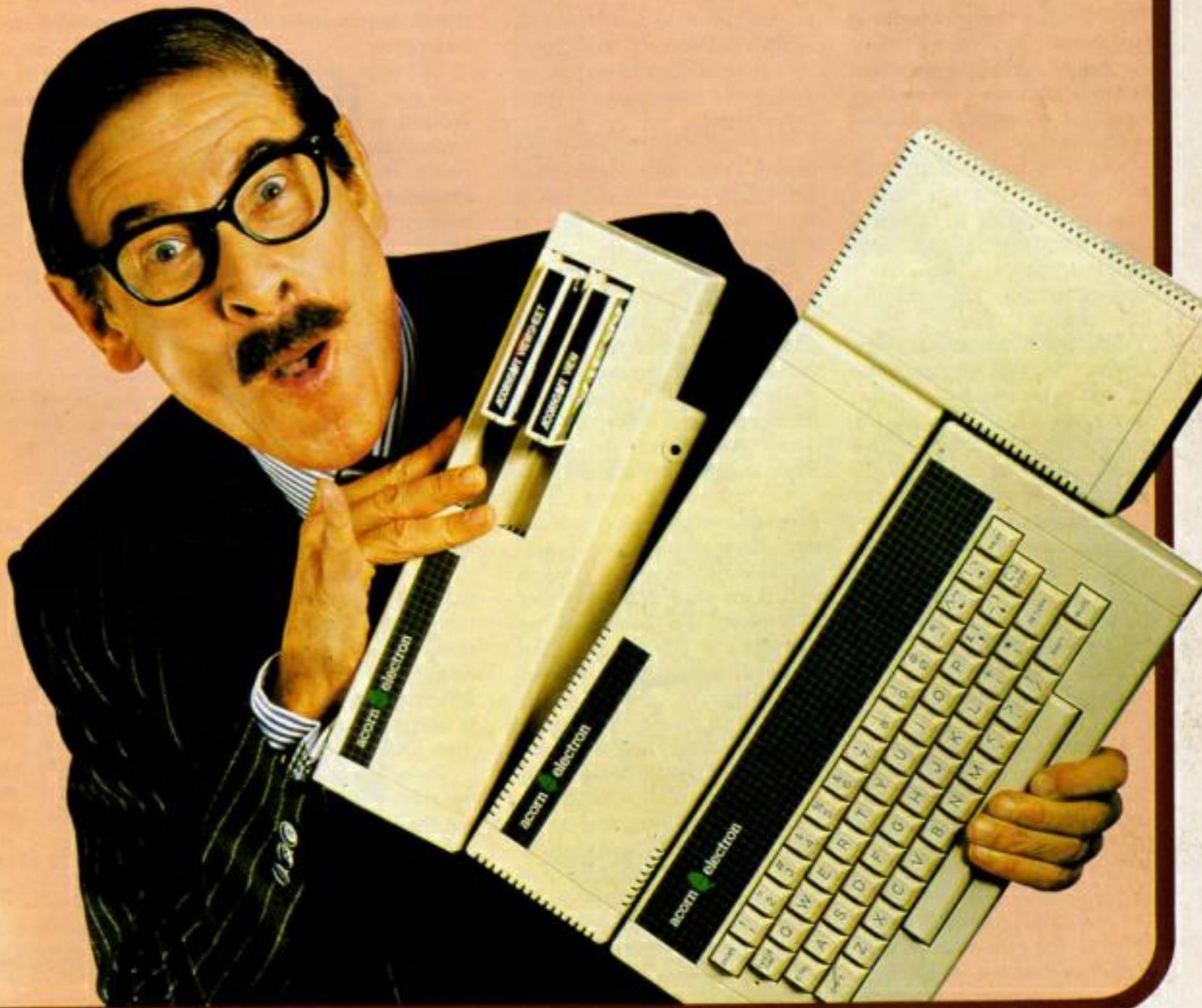
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## MIKE PLUMMER introduces you to his turtle graphics language

**POGO is a programming language providing many of Logo's turtle graphics commands plus some other facilities which I will describe later.**

As it is not exactly like normal Logo – not that there is such a thing as a standard Logo – and differs from most turtle graphics programs, I have called the language Pogo (Plummer's Logo).

Despite its omissions – for instance, it has no functions for list processing – Pogo should at least give you a grounding in some of the techniques used in Logo.

For the uninitiated, a turtle graphics program draws pictures by sending an imaginary turtle round the screen leaving a track behind it. The commands within the language allow you turn the turtle, make it go forwards and backwards and start or stop drawing its track.

There is a procedural mechanism similar to BBC Basic's DEFPROC which allows you to define a set of small pictures and then build up a more complicated picture by calling up the smaller ones by name.

I have split the description of Pogo into two articles. This part describes the Pogo compiler, its structure and how it

works. The second will contain a description of the Pogo language, a tutorial in its use and some examples of Pogo definitions.

The main difference between Pogo and some other turtle graphics programs is that it is a compiler, not an interpreter.

An interpreter reads the actual program code that you have typed in and whenever it comes across the name of a variable or procedure looks in memory to find where that item is stored. It has to do that every time it finds the name, even in the same statement.

On the other hand compilers convert the program text into code, change all references to variables and so on into actual memory addresses and calculate the address for branches to go to before the program is run. This enables the program to run much faster. Also the compiled code tends to occupy less memory.

In the extreme, some compilers convert the program code into pure machine code. A lot of compilers, and Pogo is one of them, convert the source code into a very much more compact intermediate code where all variable names and so on have been converted to memory addresses. This is

then interpreted by a run time interpreter.

In Pogo both the compiler and run time interpreter are written in Basic so they are limited by the speed of the Basic interpreter. Also the limited memory of the Electron means that something has to be sacrificed, and with Pogo you lose the ability to edit your source code.

This is not as serious as it sounds, since by the nature of this sort of programming language you start off by defining your own words and then use these in later definitions. You can make sure that the original word is thoroughly tested before including it in a later definition.

There are only very minimal editing facilities within the language, and all you can really do is to use line editing when typing in your data. Alternatively View can be used to edit the source code – you then EXEC it into Pogo.

There are commands to list the names of all words – but not their definitions – and the variables set up. Definitions can be erased from memory when no longer required.

The compiler will work with tape or disc although the amount of memory available for your Pogo programs

depends on the value that PAGE is set to. There is around 2k available with a Plus 3, and 6k with cassette, Plus 4 and Cumana disc systems.

I don't intend to describe completely how the program works as it would occupy an enormous amount of text, but just to give a brief résumé of the structure of the compiled code and the procedures and principal variables used.

A Pogo program consists of a series of reserved words that are converted into a pseudocode which is stored in one of two buffers. The first, called the immediate buffer, contains compiled code which will be run when any code entered in direct mode has been successfully compiled.

Typing in commands in direct mode is similar to typing:

`PRINT "HELLO"`

in Basic and getting the response HELLO printed on the screen straight away. This is as opposed to typing:

`10 PRINT "HELLO"`

where the print statement becomes part of a Basic program.

The equivalent to the second case in Pogo is when

defining a new word. Here the compiled code is inserted into the definition buffer. A defined word is just a series of Pogo statements which can be called by name, much as a BBC Basic procedure.

As with procedures it is possible to pass parameters to a defined word. You can also define integer variables with names that begin with a #.

A reserved word is stored in a buffer as an op-code followed by the parameters. A variable is stored as the name followed by &OD plus four bytes for the value. A defined word is stored as the name followed by &OD, the number of parameters and address of the next definition.

Expressions using variables are stored as strings but with all variables names converted to ! (address of variable). The expression is evaluated at run time using Basic's EVAL function.

Two areas of memory are used as workspace. The first is the Pogo stack which contains branch addresses when compiling and return addresses

and loop counters when running.

The second is a local parameter area. This contains the names of a defined word's parameters when compiling and the parameter values when running.

When any input is read from the keyboard or a file using EXEC the input string is parsed token by token until the string is empty. The code is compiled into the immediate buffer and run if you are in immediate mode.

When defining a new word using TO, code is compiled into the definition buffer until an END statement is found. Any errors detected during compilation or when executing compiled code cause the current action to be interrupted and a message printed giving the cause of the error.

You should be able to fathom out the method used to compile and run the language from the information I have given here. Next month we'll see how to write Pogo programs but in the meantime you can check if your program is

working by typing in this short program:

```
TO SQUARE
cls
print "A square"
repeat 4
{
    forward 200 : right 90
}
END
```

Enter SQUARE to run it. You

can probably guess what it draws!

One thing to note when entering the program: until you are sure that you have it working properly enter line 620 as:

```
620 REPORT:PRINT" at line
";ERL
```

It will help when debugging.

- That's all for this month, next time we'll look at the language in more detail.

### Pogo listing

```
10 REM POGO
20 REM Turtle Graphics
30 REM By M.J.Plummer
40 REM (c) Electron User
50 GOTO540
60 :
70 REM Execute reserved
word
80 DEFFPROCrn(p%):LOCALn
%:Z%:=Z%+2
90 IF p%<1 OR p%>36 PROC
er(11):ENDPROC
100 ON p% GOTO 120,130,14
0,150,160,170,240,250,260,2
70,300,320,380,400,410,420,
360,390,310,430,270,280,210
,440,110,310,450,460,190,47
0,480,490,310,510,520,100
110 n%:=!Z%:Z%:=Z%+4:IF n%>
0 !n%:=FNgval:ENDPROC ELSE L
%:(n%+4-1):FNgval:ENDPROC
120 Q%:=TRUE:ENDPROC
130 PROCrn(FNgval):ENDPRO
C
140 PROCrn(-FNgval):ENDPR
OC
150 CLS:ang=0:X%=-640:Y%=-5
12:MOVE X%,Y%:soh=@:coh=1:PR
OCdrtl:ENDPROC
160 PROCrn(-FNgval):ENDPR
OC
170 PROCrn(FNgval):ENDPRO
C
180 PROCdrtl:X%=-FNgval:Y%
=-FNgval:MOVE X%,Y%:PROCdrtl
:ENDPROC
190 Z%:=0:ENDPROC
200 L%:=L%-L%?-1*4-1:Z%:=FN
pop:ENDPROC
210 n%:=Z%:UX=?(!Z%-5):MX=
L%+UX*4:?MX=UX:V%=-4:Z%:=Z%+
4
```

### PROCEDURES AND FUNCTIONS

run()	Execute reserved word.
gtk	Get next token.
comp	Compile next token.
exec	Execute immediate code.
push()	Push number onto stack.
pop	Pop number from stack.
ifl	Compile IF.
el	Compile ELSE.
rep	Compile REPEAT.
while	Compile WHILE.
mk	Compile MAKE.
def	Define a new word.
end	End definition.

### VARIABLES

A%	Defining/immediate flag.
C%	Code buffer.
F%	IF nesting.
G%	ELSE flag.
H%	Turtle heading.
J%	Immediate buffer.
K%	WHILE nesting.
O%	Pointer to previous definition.
R%	REPEAT nesting.
S%	Stack pointer.
T%	Text pointer.
W%	Definition buffer.
X%, Y%	Turtle coordinates.
Z%	Program pointer.

**From Page 39**

```

400 PROCpush(FNgval):ENDP
ROC
410 BX=TRUE:ENDPROC
420 BX=FALSE:PROCdrtl:END
PROC
430 VDU FNgval:ENDPROC
440 PROCdshow:ENDPROC
450 PROCsv:ENDPROC
460 PROCld:ENDPROC
470 PROCflin:ENDPROC
480 PROCspl:ENDPROC
490 n%!=Z%:Z%==Z+4:IF n%(
@ n%+L%+n%*4-1
500 INPUT!n%:ENDPROC
510 OSCLI $Z%:Z%==Z+LEN$Z
%+1:ENDPROC
520 PRINT"Bytes used "
,W%-CX%"Bytes free ",C
%+DX-W%"Local area used",L
%+locs%"Stack size ",CX+D
%+S%-4":ENDPROC
530 :
540 MODE4
550 ON ERROR GOTO610
560 DX=2000+1000-PAGE:DI
M CX DX:DIM im 256:DIM i 2
56:DIM locs 512
570 PROCinit:PROCdrtl
580 REPEAT:PROCcomp:UNTIL
Q%:MODE6:END
590 :
600 REM Handle BASIC erro
rs
610 IF NZ NZ=FALSE:PROCin
vc(FALSE):*SPOOL
620 IF ERR=17 PRINT "'Es
cape"+CHR$7":GOTO580 ELSE I
F ERR=214 PROCer(17):GOTO58
0 ELSE IF ERR=26 OR ERR=16
PROCer(11):GOTO580 ELSE MOD
E6:REPORT:PRINT" at line ";
ERL:END
630 :
640 REM Get code from inp
ut buffer
650 DEFFNgtk:LOCALk$,j$
660 IF $ln<>" GOTO 700
670 IF NZ INPUT LINE"*$ln
ELSE IF AX=0 INPUT LINE"-"
*$ln ELSE INPUT LINE"*$ln
680 IF AX=0 JZ=im:fim=STR
INB$(255,CHR$0):FX=0:RX=0:K
Z=0
690 IF $ln<>" GOTO670
700 IF LEFT$(ln,1)=" " $

```

```

ln=MID$(ln,2):GOTO 700
710 IF RIGHTS$(ln,1)=" "
$ln=LEFT$(ln,LEN$ln-1):GOT
0710
720 IF LEFT$(ln,1)=CHR$3
4:T%=INSTR(ln,CHR$34,2):k$=
LEFT$(ln,T%):$ln=MID$(ln
,T%+1):IF T%>0 PROCer(1):="
"
730 IF k$(>" ")=k$"
740 T%=INSTR(ln," "):IF
T%>0 k$=$ln:$ln="" ELSE k$=
LEFT$(ln,T%-1):$ln=MID$(ln
,n,T%+1)
750 T%+=1
760 REPEAT:j$=MID$(k%,T%,
1):IF j$="a" AND j$<="z" k$=
LEFT$(k%,T%-1)+CHR$(ASC(j$)
AND&5F)+MID$(k%,T%+1)
770 IF ASC(j$)>127 OR ASC(j$)
<32 k$=LEFT$(k%,T%-1)+MID$(k%
,T%+1)
780 T%+=T%+1:UNTIL T%>LENk$
790 =k$
800 :
810 REM Initialise system
820 DEFPROCinit
830 $ln=""
840 AX=FALSE:BX=FALSE:EX=
FALSE:G=TRUE:H%=0:LX=locs:N
I=FALSE:O%:CX:P%=TRUE:Q%:FA
LSE:S%:CX+DX-4:W%:CX:XZ=640
:Y%:512:Z%:0
850 soh=0:coh=1:ang=0
860 PRINTTAB(9,1);:"POGO (
V1.0) by M.J.Plummer":MOVE
640,512
870 ENDPROC
880 :
890 REM Report errors
900 DEFPROCer(e%):LOCALj%
,k%:j%:0:RESTORE 940:EX=TRU
E:JZ=im:AZ=0:S%:CX+DX-4:W%:
0:VDU4
910 FOR j%:1 TO e%:READ k%:N
EXT:IF Z%PRINT"Execution";E
LSEPRINT"Compilation";
920 PRINT" error ":"CHR$7
+k$:$ln"":IF NZ NZ=FALSE:
PROCinvc(FALSE):*SPOOL
930 ENDPROC
940 DATA Missing quotes,U
ndefined,Bad expression,Inc
omplete,Bad list,Stack full
,Stack empty,IF list,REPEAT
list,WHILE list,Bad states
ent,Bad name,Bad parameters
,Already defining,Memory fu
11, No definition,Bad file,A
lready exists,Parameters
950 :
960 REM Compile a line of
code
970 DEFPROCcomp:LOCALt%:E
I=FALSE:t%:FNgtk:IF EX ENDP
ROC
980 IF FNres(t%):IF FNwdw
(t%):IF FNasg(t%):PRINT"**+
*";t%: * **":PROCer(2):EN
DPROC
990 IF EX ENDPROC ELSE IF
$ln="" AND AX=0 PROCexec
1000 ENDPROC
1010 :
1020 REM Reserved words
1030 DATA QUIT, FORWARD, BAC
K,CLS,LEFT,RIGHT,UP,DOWN,?,.
TYPE,IF,J,ELSE,REPEAT,HIDE,
SHOW,WHILE,MAKE,TO,VDU,PRIN
T,END,,LIST,,,SAVE,LOAD,BR
EAK,EXEC,SPOOL,ACCEPT,FORGE
T,OSCLI,SIZE,6POS,!
1040 :
1050 REM Test for reserved
word
1060 DEFFNres(t%):RESTORE1
030:LOCALn%,k%:n%:0
1070 IF t%=";" :=FALSE
1080 IF t%="/*" REPEAT UNTI
L FNgtk="*/":=FALSE
1090 IF t%="NEW" RUN
1100 IF t%="**" :=FALSE
1110 REPEAT READk%:n%:n%+1
:UNTIL k%="**" OR INSTR(k%,t
%)
1120 IF k%="**" :=TRUE
1130 IF AX?W%:1:W%?1=n%:W
%:W%+2 ELSE ?J%:1:J%?1=n%:J
%:J%+2
1140 IF n%:2 OR n%:3 OR n%
=5 OR n%:6 OR n%:20 PROCexp
r
1150 IF n%:10 OR n%:21 PRO
Cgetp
1160 IF n%:11 PROCif1:GOTO
1310
1170 IF n%:12 PROCelst:=FA
LSE
1180 IF n%:13 PROCel:GOTO1
310
1190 IF n%:14 PROCrep:GOTO
1310
1200 IF n%:17 PROCwhile:GOT
01310
1210 IF n%:18 PROCmk
1220 IF n%:19 PROCdef:GOTO
1310
1230 IF n%:22 PROCend
1240 IF n%:27 OR n%:28 OR
n%:30 OR n%:31 OR n%:34 PRO
Ctxt
1250 IF n%:32 PROCivar(FNg
tk)
1260 IF n%:33 PROCfgt(FNg
tk)
1270 IF n%:>36 GOTO 1290 E
LSE PROCepr:IF FNgtk<">",
PROCer(11):=FALSE
1280 PROCepr
1290 IF $ln="":GOTO1310 EL
SE k%:FNgtk
1300 IF k%="]" $ln="] "+$1
n ELSE IF k%>">":PROCer(11
)
1310 GI=FALSE:=FALSE
1320 :
1330 REM Execute the conte
nts of the immediate buffer
1340 DEFPROCexec:IF FX PRO
Cer(8):ENDPROC ELSE IF RX P
ROCer(9):ENDPROC ELSE IF K%
PROCer(10):ENDPROC
1350 AX=0:FX=FALSE:RX=FALSE
E:Z%:im:L%:locs:S%:CX+DX-4
1360 REPEAT:IF Z%:1 PROCer
un(Z%?1) ELSE Z%:0
1370 UNTIL Z%:0 OR Z%:0:Z
%:0
1380 IF POS<>0 PRINT
1390 ENDPROC
1400 :
1410 REM Draw pointer
1420 DEFPROCdrtl:IF BX END
PROC ELSE LOCALq%,w%,e%,r%:
6COL3,1
1430 q%:15+coh:w%:25+soh:e
%:15+soh:r%:25+coh:MOVEXX,Y
%:PLOT8,-q%,e%:PLOT1,q%+w%,
-e%+r%:PLOT65,0,0:PLOT1,q%-
w%,-e%+r%:PLOT1,-2*q%,2*e%:
MOVEXX,Y%:6COL8,1:ENDPROC
1440 :
1450 REM Put expression in
to buffer
1460 DEFPROCexpr:LOCALn%,p
%,i%,j%,k%:IF FNeck ENDPROC
ELSE k%:FNgtk
1470 IF $ln="":GOTO 1490 E
LSE j%:FNgtk:IF INSTR("[",j
%),$ln=j%+" "+$ln:GOTO 1
490
1480 k%:k%+j%:GOTO1470
1490 V%:INSTR(k%,"#"):IF V
%:0 GOTO1520 ELSE j%="":p%=

```

```

VZ-1:VZ=VZ+1
1580 i$=MID$(k$,VZ,1):IF F
Nalpn(i$) j$=j$+i$:VZ=VZ+1:
GOTO1580
1510 nZ=FNvar(j$):IF nZ>0
k$=LEFT$(k$,pZ)+"!"+STR#nZ+
MID$(k$,pZ+LENj$+2):GOTO149
0 ELSE IF nZ<0 nZ=4+nZ:k$=L
EFT$(k$,pZ)+"L!"+STR$(nZ-1)
)+MID$(k$,pZ+LENj$+2):GOTO1
490 ELSE PRINT "Variable "
j$:PROCer(2):ENDPROC
1520 PROCinbf(k$)
1530 ENDPROC
1540 :
1550 REM Put a string into
buffer
1560 DEFPROCinbf(k$):IF AZ
GOTO 1580
1570 $JZ=k$:JZ=JZ+1+LENk$:
ENDPROC
1580 $WI=k$:WI=WI+1+LENk$:
ENDPROC
1590 :
1600 REM Extract value fro
m buffer
1610 DEFFNgval:LOCALans:an
s=EVAL($ZI):ZI=ZI+1+LEN$ZI:
=ans
1620 :
1630 REM Move
1640 DEFPROCAv(n):LOCAL m:
PROCdrtl:m=n$soh:XZ=XX+m:IF
m-INTm>0.5 XZ=XZ+1
1650 m=n$coh:YI=YI+m:IF m-
INTm>0.5 YI=YI+1
1660 IF PX GCOL 0,1:DRAW X
Z,YI ELSE MOVE XZ,YI
1670 PROCdrtl:ENDPROC
1680 :
1690 REM Turn
1700 DEFPROCtn(n):LOCALhd:
PROCdrtl:ang=(ang+n) MOD 36
0:hd=RADang:soh=SIN(hd):coh
=COS(hd):PROCdrtl:ENDPROC

1710 :
1720 REM Get text and put
in buffer
1730 DEFPROCTxt:LOCALk$:IF
FNeck ENDPROC ELSE k$=FNgt
k:IF EX ENDPROC
1740 IF LEFT$(k$,1)=CHR#34
k$=MID$(k$,2,LENk$-2)
1750 PROCinbf(k$):ENDPROC
1760 :
1770 REM Check for valid n
ame characters

```



```

1780 DEFFNalpn(k$):IF(k$)=
"A" AND k$<="Z") OR(k$)="B"
AND k$<="9") OR k$="_":=TR
UE ELSE =FALSE
1790 :
1800 REM Check for end of
input
1810 DEFFNneck:IF AZ=0 AND
$ln==" PROCer(4):=TRUE ELSE
=False
1820 :
1830 REM Push number onto
stack
1840 DEFPROCpush(nZ):!GZ=n
Z:SZ=SZ-4:IF SZ<WI PROCer(6
):
1850 ENDPROC
1860 :
1870 REM Pop a number fro
m stack
1880 DEFFNpop:SZ=SZ+4:!=SZ
1890 :
1900 REM Put IF into buf
fer
1910 DEFPROCif1:LOCALt$:$R
OCexpr:IF EX ENDPROC
1920 t$=FNgtk:IF EX ENDPRO
C ELSE IF t$<>" PROCer(5)
:ENDPROC
1930 FI=FI+1:IF AZ=0 PROCP
ush(JZOR&100000):JZ=JZ+4 ELS
E PROCpush(WZOR&100000):WZ=W
Z+4
1940 ENDPROC
1950 :
1960 REM Process end of li
st
1970 DEFPROCelst:LOCALk$,j
Z:kZ=FNpop:IF SZ>CX+DZ-4 PR
OCer(5):ENDPROC ELSE jZ=(kZ

```

C ELSE IF t\$<>" PROCer(5)
:ENDPROC
2160 RI=RI+1:IF AZ=0 PROCP
ush(JZOR&300000) ELSE PROCPu
sh(WZOR&300000)
2170 ENDPROC
2180 :
2190 REM WHILE loop
2200 DEFFPROCwhile:IF AZ=0
PROCpush(JZOR&400000):JZ=JZ+
4 ELSE PROCpush(WZOR&400000)
:WI=WI+4
2210 PROCEexpr:IF EX ENDPRO
C ELSE IF FNgtk<>" PROCer
(5):ENDPROC
2220 KI=KI+1:ENDPROC
2230 :
2240 REM Declare a new var
iable
2250 DEFPROCak:IF AZ=1 PRO
Cer(14):ENDPROC
2260 LOCALt\$,nZ:t\$=FNgtk:I
F LEFT\$(t\$,1)=" ":t\$=MID\$(t
\$,2):AZ=1 ELSE PROCer(12):E
NDPROC
2270 nZ=FNglb(t\$):IF nZ>0
PRINT "## ";t\$;" ##":PROC
er(18):ENDPROC
2280 nZ=1:REPEAT IF NOT FN
alpn(MID\$(t\$,nZ,1)) nZ=-1 E
LSE nZ=nZ+1
2290 UNTIL nZ=-1 OR nZ=LEN
t\$+1:IF nZ=-1 PRINT "## ";
t\$;" ##":PROCer(12):ENDPRO
C
2300 ?WI=2:WI=WI+1
2310 PROCinbf(t\$):!WI=0:WI
=WI+4
2320 AZ=0:OZ=WI:ENDPROC
2330 :
2340 REM Set TYPE or PRINT
parameter
2350 DEFPROCgetp
2360 IF ASC\$ln=32 \$ln=MID\$(
\$ln,2):GOTO2360
2370 IF ASC\$ln=34 GOTO 239
0 ELSE IF AZ=0 ?JI=0:JX=JX+
1 ELSE ?WI=0:WI=WI+1
2380 PROCEexpr:ENDPROC
2390 IF AZ=0 ?JI=1:JZ=JZ+1
ELSE ?WI=1:WI=WI+1
2400 PROCtxt:ENDPROC
2410 :
2420 REM Find a variable
2430 DEFFNvar(t\$):LOCALnZ:

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```

n% = FNparam(t$): IF n% GOT0244
0 ELSE n% = FNglb(t$)
2448 IF n% = 0 OR ((n% > 0) AND
D (n% AND &10000)) := 0 ELSE =
n%
2458 :
2468 REM Search for a global variable
2478 DEFFNglb(t$): LOCALn%:n% = C%
2488 IF n% >= W% OR n% = 0 := 0
ELSE IF ?n% = 3 GOT0 2498 ELSE IF
?n% = 2 n% = n% + 1: IF t$ = $n%
n% = n% + LEN$t + 1 := n% ELSE n%
= n% + LEN$n% + 5: GOT02488
2498 IF ?n% = 3 n% = n% + 1: IF $n%
= t$ n% = n% + LEN$n% + 6 := n% XOR&
100000 ELSE n% = n% + LEN$n% + 2: n%
= !n%: GOT02488
2508 :
2518 REM Search for parameter
2528 DEFFNparam(t$): LOCALn%:k%:k% = locs:n% = -1
2538 IF t$ = $k% := n% ELSE IF k% >= L% := 0 ELSE n% = n% - 1: k%
= k% + LEN$k% + 1: GOT02538
2548 :
2558 REM Show dictionary
2568 DEFPROCdshow: LOCALn%:n% = C%: PRINT
2578 IF n% = W%: PRINT: ENDPROC
2588 IF ?n% = 2 n% = n% + 1: PRINT
"#" + $n%; : n% = n% + LEN$n% + 1: PRI
NTTAB(28); "Value = "; !n%: n%
= n% + 4: GOT02578
2598 n% = n% + 1: PRINT n%: n% =
n% + LEN$n% + 1: PRINTTAB(28); "Parameters ("; ?n%; "): n% = !(n%
+ 1)
2608 GOT02578
2618 :
2628 REM Define a new word
2638 DEFPROCdef: IF A% > 0 PROC
OCer(14): ENDPROC ELSE A% = 1
2648 LOCALt$, n%: t$ = FNgtkin
z = 1: REPEAT IF NOT FNalpn(MI
D$(t$, n%, 1)) n% = -1 ELSE n% =
n% + 1
2658 UNTIL n% = -1 OR n% = LEN
t$ + 1: IF n% = -1 PRINT "### ";
t$; "###": PROCer(12): ENDPROC
2668 n% = FNglb(t$): IF n% > 0
PRINT "### "; t$; "###": PROC

```

```

er(18): ENDPROC
2678 0% = W%: ?W% = 3: W% = W% + 1: $W% = t$: W% = W% + LEN$t + 1: IF W% > S
Z PROCer(15)
2688 ?W% = 0: L% = locs
2698 IF $ln = "" GOT02758 ELSE
n% = 1: t$ = FNgtk
2708 IF LEFT$(t$, 1) = "#": t$ =
MID$(t$, 2): A% = 1 ELSE PROCer
r(12): ENDPROC
2718 n% = 1: REPEAT IF NOT FN
alpn(MID$(t$, n%, 1)) n% = -1 ELSE
n% = n% + 1
2728 UNTIL n% = -1 OR n% = LEN
t$ + 1: IF n% = -1 PRINT "### ";
t$; "###": PROCer(12): ENDPROC
2738 $L% = t$: L% = L% + LEN$t + 1:
?W% = ?W% + 1: IF $ln = "" GOT0 27
58
2748 t$ = FNgtk: IF t$ = ", " GOT
T02698 ELSE $ln = t$ + " " + $ln
2758 W% = W% + 1

```

This is one of hundreds of programs now available FREE for downloading on



```

2768 PROCpush(W%XOR&70000): W% = W% + 4
2778 IF $ln <> "" PROCer(13)
2788 ENDPROC
2798 :
2808 REM End of a definition
2818 DEFPROCend: LOCALk%: k% = FNpop: IF k% AND &70000 <>
&70000 OR A% <> 1 PROCer(16):
ENDPROC
2828 A% = 0: !k% = W%: D% = W%: END
PROC
2838 :
2848 REM Find defined word
2858 DEFFNdwd(t$): LOCALn%, k%: n% = FNglb(t$): IF n% = 0 OR
t$ = "" := TRUE ELSE IF n% < &100
00 PRINT "Definition "; t$: PROCer(2): = FALSE ELSE n% = n%
AND &FFFF: k% = ?(n% - 5)
2868 IF A% = 0 ?J% = 1: ?(J% + 1)
= 23: !(J% + 2) = n%: J% = J% + 6 ELSE
?W% = 1: ?(W% + 1) = 23: !(W% + 2) = n%
: W% = W% + 6
2878 IF k% = 0 GOT0 2888 ELSE
PROCexpr: k% = k% - 1: IF k% > 0

```

```

t$ = FNgtk: IF t$ = ", " GOT02878
2888 IF k% PROCer(19) := FALSE
SE
2898 IF LEFT$(ln, 1) = " " $ln = MID$(ln, 2): GOT02898
2908 IF LEFT$(ln, 1) = ":" $ln = MID$(ln, 2)
2918 = FALSE
2928 :
2938 REM Assign value to variable
2948 DEFFNasg(t$): IF LEFT$(t$, 1) <> "#" := TRUE ELSE t$ =
MID$(t$, 2): n% = 1
2958 IF NOT FNalpn(MID$(t$, n%, 1)) PRINT "### "; t$; " "
###": PROCer(12): = FALSE ELSE
IF n% <> LENt$ n% = n% + 1: GOT029
58
2968 n% = FNparam(t$): IF n% = 0
n% = FNglb(t$): IF n% = 0 PRINT
"### "; t$; " ###": PROCer(2): = FALSE
2978 IF A% = 0 ?J% = 1: ?(J% + 1)
= 23: !(J% + 2) = n%: J% = J% + 6 ELSE
?W% = 1: ?(W% + 1) = 23: !(W% + 2) = n%
: W% = W% + 6
2988 IF FNgtk <> "" PROCer(3): ELSE
PROCexpr
2998 = FALSE
3008 :
3018 REM Set up input address
3028 DEFPROCivar(t$): IF LEFT$(t$, 1) <> "#" := ENDPROC ELSE
t$ = MID$(t$, 2): n% = 1
3038 IF NOT FNalpn(MID$(t$, n%, 1)) PRINT "### "; t$; " "
###": PROCer(12): = ENDPROC ELSE
IF n% <> LENt$ n% = n% + 1: GOT0
3038
3048 n% = FNparam(t$): IF n% = 0
n% = FNglb(t$): IF n% = 0 PRINT
"### "; t$; " ###": PROCer(2): ENDPROC
3058 IF A% = 0 !J% = n%: J% = J% +
4 ELSE !W% = n%: W% = W% + 4
3068 ENDPROC
3078 :
3088 REM Save current definitions
3098 DEFPROCsv: LOCALi%, f%: f% = OPENOUT($Z%): Z% = Z% + LEN$Z%
+ 1: IF f% = 0 PROCer(17): ENDPROC
3108 i% = C%: IF W% > CX REPEAT
PUT# f%, ?i%: i% = i% + 1: UNTIL

```

```

i% = W%: 3118 CLOSE#f%: ENDPROC
3128 :
3138 REM Load new definitions
3148 DEFPROCId: LOCALf%: f% = OPENIN($Z%): Z% = Z% + LEN$Z% + 1:
IF f% = 0 PROCer(17): ENDPROC
3158 CLS: PROCinit
3168 IF NOT EOF#f% REPEAT
?W% = BGET#f%: W% = W% + 1: UNTIL EOF#f% OR W% > CX + D%
3178 IF NOT EOF#f% PROCer(15)
3188 CLOSE#f%: ENDPROC
3198 :
3208 REM Read input from ASCII file
3218 DEFPROCflin: OSCLI "EX
EC "+$Z%: Z% = Z% + LEN$Z% + 1: END
PROC
3228 :
3238 REM Save input in a file
3248 DEFPROCsp1: PROCinvc(T
RUE): OSCLI "SPOOL "+$Z%: Z% = Z%
+ LEN$Z% + 1: NI = TRUE: ENDPROC
3258 :
3268 REM Forget defined words
3278 DEFPROCfgt(t$): LOCALj%
, n%: j% = TRUE: IF ASct$ = 35 t$ =
MID$(t$, 2): j% = FALSE
3288 n% = FNglb(t$): IF n% = 0
PRINT "### "; t$; " ###": PRO
Cer(2): ENDPROC
3298 IF (NOT j% AND n%) & FF
FF) OR (j% AND n% < &10000) P
ROCer(2): ENDPROC
3308 W% = (n% AND &FFFF) - 2: IF
j% W% = W% - 4
3318 REPEAT W% = W% - 1: UNTIL
?W% < 4: $ln = "": ENDPROC
3328 :
3338 REM Invert colours
3348 DEFPROCinvc(n%)
3358 IF n% COLOUR129: COLOU
R0: GCOL 0, 129: GCOL 0, 0 ELSE
COLOUR128: COLOUR1: GCOL 0, 1
28: GCOL 0, 1
3368 ENDPROC

```

*This listing is included in this month's cassette tape offer. See order form on Page 61.*

## All the programs from the last 12 months of Electron User are available on tape.

**On the December 1986 tape:**

**Santa's Sleigh** Help Father Christmas fill his sleigh with presents in this fast arcade game. **Yule Spell** Spelling can be fun with this seasonal variation on the old favourite hangman. **Pogo** A Logo turtle graphics compiler. **Function Key Lister** Keep track of your function key definitions with this helpful utility. **10 LINERS** Two short but impressive graphics demonstrations.

**On the November 1986 tape:**

**TRAIN TROUBLE** You've just robbed a bank. Can you escape the forces of law and order in this chase over the carriages of a fast moving express? **DAY AT THE RACES** You can gamble away to your heart's content in safety with our entertaining two player horse racing game. **BASIC COMPILER** This superb utility will turn your Basic programs to machine code in no time at all. **10 LINERS** A routine from our fascinating series of short programs.

**On the October 1986 tape:**

**RAT CATCHER** Try your hand at pest control with this fast action arcade game. **MATHS RUN** Put your powers of mental arithmetic to the test with this educational program. **BOS** This on screen editor will take the tedium out of debugging listings and sort out your typing slips. **CROSSWORD** Two programs for crossword lovers - one to design crosswords and the other to help you solve them. + **BONUS game**; **QUASIMODO'S QUEST** Rescue Esmerelda in this colourful version of the all time favourite.

**On the September 1986 tape:**

**CAVERN CAPERS** Blast your way from the depths of the labyrinth to escape from the planet. **DRAW WRITER** A superb utility to translate your on screen graphics to the procedures to create them. **COMPANY COUNT** Work your way up the company pecking order in this educational maths test. **TEN LINERS** Another short but fascinating program. + **BONUS game**; **ROCKFALL** Go diamond mining in this intriguing

multi-screen arcade romp.

**On the August 1986 tape:**

**HOWZAT!** A vivid recreation of a day's test cricket for two players. **3D MAZE** Quick reactions and a sense of direction are needed to escape from our twisty maze. **TEXTED** Let this versatile text editor turn your micro into an electronic typewriter. **DRIVER** A powerful printer driver for View.

**On the July 1986 tape:**

**ROYAL WEDDING** Celebrate the royal event with our ingenious sliding block puzzle. **SNAPDRAGON** Two player version of the classic card game. **ATTRIBUTES** Colourful two player strategy game. **FORMATTER** Make your listings easier to read. **DISCS** Extended star commands. **EXTRA COMMANDS** A WHILE... WEND command for your micro. **PLUS** superb digitised picture of Andrew and Sarah.

**On the June 1986 tape:**

**FISHING** Enjoy a quite day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone screens dumps for Epson compatible printers.

**On the May 1986 tape:**

**MISSILE JAMMER** Defend the city of Pezina from a missile invasion. **VECTOR LETTERS** Use \*LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

**On the April 1986 tape:**

**INVASION FORCE** Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACH TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH and RECOVER** Two

routines from the disc article.

**NOTEBOOK** Recursion backwards.

**On the March 1986 tape:**

**GRAND PRIX** Exciting race game. **DICER** A clever test of strategy. **MARCHING ORDER** Counting and ordering numbers. **FIND AND REPLACE** Useful editing program. **SECTOR EDITOR** Excellent disc utility. **TIMEPIECE** Superb graphics demonstration. **OXO** Game of cunning. **TRICIRC** A circle of triangles.

**On the February 1986 tape:**

**NECROMANCER** Superb text adventure. **GREBIT** Arcade action. **FAST BACKUP** Disc utility. **MACHINE CODE** How to write an arcade game. **TAPEDISC** More software transferring techniques. **SIDEWAYS RAM** Example program.

**On the January 1986 tape:**

**FRUIT WORM** An arcade classic. **HELICOPTER RESCUE** Pilot an air sea rescue helicopter. **MACHINE CODE** Detect collisions between sprites. **TAPEDISC** Transfer your software to disc. **MODE012** Multi-Mode screens.

**On the December 1985 tape:**

**GET SET SANTA** Christmas fun collecting presents. **MISSILE ATTACK** Save your cities! **PROGRAM PROBE** Using joysticks. **SPACE COUNT** Counting for youngsters. **CHRISTMAS CARD** Cards and carols for all. **DISC MENU** Disc Menu creator.

**On the November 1985 tape:**

**KARATE WARRIOR** Electrifying combat. **ULA Mode 6 Mode 7!** **PAINT ROLLER** Colourful arcade action. **DEFUSE** Beware the bombs. **SPRITE PRINT** Machine code graphics utility. **TRAIN** Far from stationery graphics.

Save wear on your fingers and ensure all your programs are error-free by using our monthly tapes. They are only: £3.75.

TO ORDER, PLEASE USE THE ORDER FORM ON PAGE 61

### The story so far

WE haven't gone very far on our intrepid journey into Basic, but already we've come across a lot of things. We've seen how to use the PRINT command – along with the appropriate punctuation – to get information displayed. Also, in case we're not satisfied, we've learned how to use CLS to clear the screen.

Not content with this we've moved on to the keyword LET, which allows us to create variables. And as you might expect from the name, we varied our variables. Finally we moved from the command mode we'd been using and learned how to LIST and RUN a simple program.

### Yet more varying variables

Set up four variables with:

```
LET total=0  
LET a=1  
LET b=2  
LET c=3
```

and now:

```
LET total=total+a
```

You should be able to see that the variable total will now hold the value 1. Check it with:

```
PRINT total
```

– in fact get your Electron to check everything I say – and then:

```
LET total=total+b
```

If you now:

```
PRINT total
```

you'll see that it has a new value, 3. This doesn't last long as:

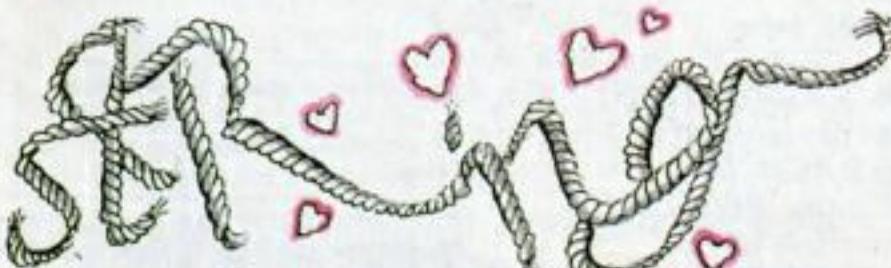
```
LET total=total+c
```

soon brings total up to 6 as a final:

```
PRINT total
```

confirms.

The point to grasp is that the variable total keeps on changing. It's been used to hold a running total of three other variables. At any time the value held in total is the consequence of the numbers which have been added to it so far. You could say that total acts as a kind of memopad, keeping track of what's happened as the variable varies.



# BACK TO BASICS

Part four of TREVOR ROBERTS' down-to-earth series



### Variable rules, OK?

You can call your variables anything you like – and you probably will when things go wrong – so long as they obey a few simple rules.

For a start they must begin with a letter. The rest of the name can be made up of letters and numbers combined in any way you like, but the first character must be a letter. From this you'll see why both:

```
LET !sttime=1
```

and:

```
LET 123FOUR=5
```

are wrong, each giving you a syntax error message to tell you that you've broken the rules of Electron Basic. However:

```
LET time1=1
```

and:

```
LET one234=5
```

are acceptable.

Also, you can't have punctuation marks, spaces or arithmetic operators (+, -, \*, /) in a name. So cats+dogs, running total and bonus! are right out as far as the Electron is concerned.

The last rule is that the variable name can't begin with a



Basic keyword as it confuses the micro. So:

```
LET PRINTERCOST=200
```

is wrong as PRINT is a Basic keyword.

You can however have:

```
LET printercost=200
```

This is because, unlike some micros, the Electron can tell the difference between uppercase and lowercase letters. This means that:

```
LET CAPITAL=1000
```

and:

```
LET capital=1000
```

produce two different variables, capital and CAPITAL.

Having said that though, don't do things like that, as it can cause mix-ups. Just because a complication is allowed doesn't mean that it has to be used. The rule in programming is KISS — Keep It Simple, Stupid! The rules for naming variables are summed up thus:

#### Rules for naming variables

RULE	WRONG	RIGHT
No spaces in variable name	sleeping dogs	sleepingDogs
Must not start with number	2ndtime	secondtime
No punctuation marks in name	pete's	petes
No arithmetic operators	night+day	nightAndDay
Can't start with keyword	LETTERS	letters

#### Variables, strings and things.

While we've been messing about with our variables and seeing what they can be called and what they do, one thing about them hasn't varied in the slightest. They have all been numeric variables.

All a numeric variable is is a variable that holds numbers or values. So we've been stuck with things like:

```
total=23
```

or:

```
numericVariable=100
```

These aren't the only type of variables the Electron will allow us. It also lets us use string variables.

Cast your mind back and you'll remember what a string is. It's just a collection of characters treated as one. You tell the Electron that you're treating them as a string by lumping them together inside quotation marks. So:

```
PRINT "ab&Z44** H7"
```

and:

```
PRINT "This is a string"
```

both print strings on the screen.

Now suppose that, for reasons we'll come to later, we want to use a variable name for a string. Can we do it? As ever, try it on your Electron and see. Use a line like:

```
LET string="H&CV)980p"
```

and the Electron will reject it with:

Type mismatch

The reason for this is that the Electron is a tidy-minded beast. It will not allow strings to be stored in numeric variables, only in string variables.

And it's very fussy about the names that these string variables can take. They follow the rules for naming our numeric variables with one important addition. They must end with the dollar sign — \$ — which you'll find on the 4 key. So while:

```
LET name="Trevor Roberts"
```

is right out, you'll find that:

```
| LET name$="Trevor Roberts"
```

is allowed. You can prove this to yourself with:

```
PRINT name$
```

which displays my name. Fame at last.

Have a go at making your own string variables and see if you can see what we gain by using them. More next time.

**HELLO** and welcome to the last article of the series. And if you can see through the tears that have flooded your eyes following that announcement, take a look at Program I.

It should cause you no problems if you think back over what we've covered in the last two months.

Can you figure out what the output will be? Try running the program and see if you're right.

```
10 REM Program I
20 a=100
30 b=200
40 PROCsum(a,b)
50 END
60 DEF PROCsum(first,sec
ond)
70 sum=first+second
80 PRINT first " + "sec
ond " = ";sum
90 ENDPROC
```

#### Program I

While it's probably no surprise to you that 100 added to 200 comes to 300, the program does have its use as a revision aid.

Take a look at the procedure defined between lines 60 and 90. This is defined using two dummy or formal parameters, *first* and *second*.

You'll find these in the brackets following the procedure name. When the procedure is called in line 40 with:

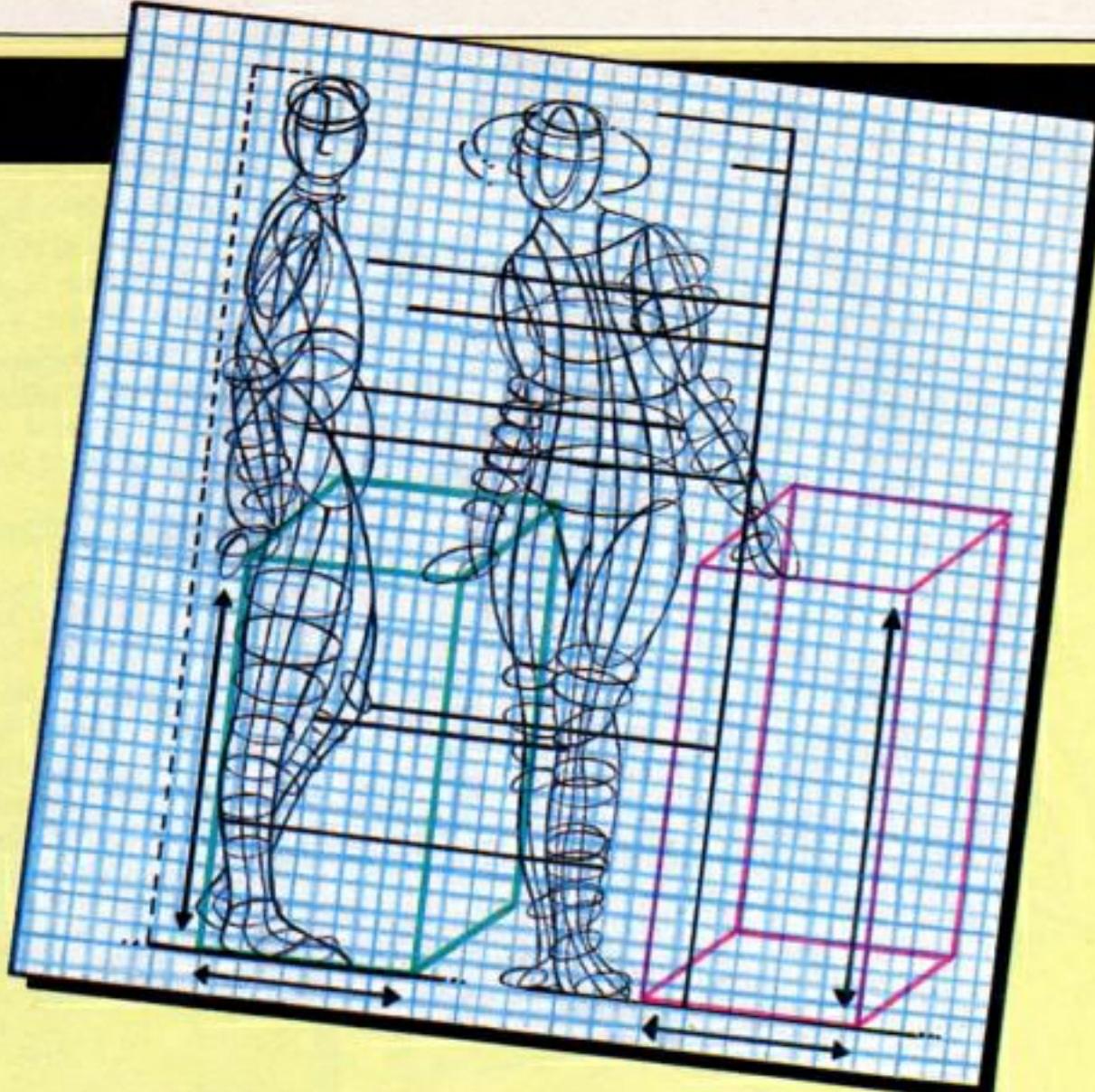
`PROCsum(a,b)`

These formal parameters take their values from the actual parameters used in the procedure call. In this case it will be the current value of the variables *a* and *b*.

Now that *first* and *second* have got their values, line 70 ensures that they are added together with the result stored in *sum*. Line 80 then tells you that:

$$100 + 200 = 300$$

and the procedure ends. The program now goes to the statement after the procedure call and since this consists of `END` the program obligingly



# Avoiding split personalities

**PETE BIBBY concludes his series on Basic programming techniques**

does just that.

Once you've mastered the intricacies of Program I, see if you can spot the difference between that and Program II.

And when you've seen that Program I's line 80 is now Program II's line 50 can you explain why the output is now:

$$0 + 0 = 300$$

The answer lies in the fact that the variables *first* and *second* are dummy variables. They are used in the procedure to show the micro what to do when it's called.

When it is, they take their values from the parameters in the procedure call but they only have these values *inside* the procedure itself.

They are known as local variables, only having a value inside the workings of the procedure. All the formal or

```
10 REM Program II
20 a=100
30 b=200
40 PROCsum(a,b)
50 PRINT first " + "sec
ond " = ";sum
60 END
70 DEF PROCsum(first,sec
ond)
80 sum=first+second
90 ENDPROC
```

#### Program II

dummy parameters in a procedure definition are local variables.

So, when line 40 calls `PROCsum`, *first* takes its value from *a* while *second* gets its from *b*.

Line 80, tucked between the `DEF PROC` and `ENDPROC` of the procedure definition

adds the two values together and stores the results in *sum*.

The procedure then ends and control returns to the statement after the procedure call. This is line 50 which attempts to display the values of *first*, *second* and *sum*.

However, it only gets the value of *sum* – 300 – correct. It seems to think that *first* and *second* are both 0!

The reason for this is that *first* and *second* are both formal parameters of the procedure definition and so, according to the rules of BBC Basic, are local variables. They can have values but only inside the procedure.

Any attempt to use them outside the procedure itself, as in line 50, results in failure.

Get it straight in your mind that the formal parameters of a procedure are local to that

procedure.

They can take values from a procedure call and use those values inside a procedure but they can't be used outside the procedure.

And once you've got that idea fixed in your head I'll now tell you that you can use *first* and *second* outside the procedure but they're not the same *first* and *second*!

If you don't believe me, add these lines:

```
35 first=1:second=2
50 PRINT "Outside the procedure"
55 PRINT "first=";first" second=";second
80 PRINT "Inside the procedure"
85 PRINT "first = ";first"
second = ";second
```

and run Program II again.

You'll see that it quite happily accepts different values for *first* and *second* depending on whether they are inside or outside the procedure. They don't clash.

In fact this is what happened during our first run of Program II. The values of *first* and *second* used inside the procedure were 100 and 200, while those outside were both zero.

From this you might see that as soon as the micro finds a procedure with formal parameters, it not only uses them as local variables inside the procedure but creates copies of them outside the procedure, setting them to zero.

Don't worry too much if this seems a bit puzzling, the Electron will keep track of things for you. Just grasp the fact that while formal parameters can have values inside a procedure, these values are local to that procedure and can only be used inside it.

And if for reasons best known to yourself you decide to use variables with the same name outside the procedure, the Electron treats them as completely different variables.

It may be confusing for us

poor humans but to the Electron it's self-evident that the parameter *first* which it finds inside the procedure definition is nothing to do with the variable *first* it might find anywhere else in the program.

Before we leave Program II, have a look at how the variable *sum* behaved. This was used both inside the procedure (line 80) and in the main program (line 50) without any problems.

It was 300 both times with none of the problems of split personality we found with *first* and *second*. A variable like this, that's available both inside and outside procedures, is called a global variable.

In fact, rather like Moliere's gentleman who was delighted to find that he'd been speaking prose all his life, we've always used global variables.

In nearly all our efforts the variables have been available to all parts of the program. It's only when we get into passing parameters that we entered the restricted world of local variables.

The trouble is that now we're using procedures we have to be careful about global variables causing unwanted side-effects. Program III shows what I mean.

```
10 REM Program III
20 a=100
30 b=200
40 sum=a+b
50 PROCdiscount(a,b)
60 PRINT "The discount price on ";sum" is ";discount
70 END
80 DEF PROCdiscount(first,second)
90 sum=first+second
100 IF sum>500 THEN sum*=sum*.9 ELSE sum*=sum*.95
110 discount=sum
120 ENDPROC
```

Program III

This purports to add together two prices, held in *a* and *b* and put the result in the variable *sum*. *PROCdiscount* is then called to figure out what discount is available on *a* and *b*

with the discount price held in *discount*.

I leave it to you to figure out how the procedure works.

The trouble is that while the procedure works, the program itself doesn't. Instead of being told that the discount price on 300 is 285 we are informed that:

The discount price  
on 285 is 285

Can you see what's happened?

The problem occurs because the variable *sum* is being used both inside and outside the procedure. Outside it is given the value 300 and then *PROCdiscount* is called.

Inside the procedure *sum* is used to hold the value of *first* added to *second* and then to hold the discount price which is eventually transferred to *discount*.

So by line 110 the *sum* inside the procedure has a value of 285. And since *sum* is a global variable this means that its original value of 300 is overwritten.

Hence *discount* and *sum* both have the same value and the silly message results. It's an unwanted side-effect of using *sum* as a working variable inside the procedure.

Of course if *sum* was local to the procedure none of the above would have happened. And this can be achieved by using the keyword LOCAL.

Used inside a procedure it limits the effect of the variables listed after it to that procedure. Logically enough it makes them local variables. Try using:

85 LOCAL sum

in Program III and you'll see the problem disappear. Now the *sums* no longer clash. Incidentally, there's another way of making *sum* local. Try passing it to the procedure as a parameter.

It's good practice to make sure that all the working variables inside procedures are local to avoid unwanted side-effects.

Of course you could avoid

them by not using the same name for variables inside and outside procedures but this isn't always easy.

Often we can build a program by adding together procedures we've already written. The trouble is that they tend to use the same variable names such as *total*, *sum*, *flag* and so on.

This is especially so since they all must have something in common as they're being "pasted" together to form one program.

By making sure that as many of the variables as possible are localised, clashes can be minimised. And talking of clashes, take a look at Program IV, last month's Program V.

```
10 REM Program IV
20 temp=0
30 PROCadd
40 first=temp
50 PROCadd
60 second=temp-first
70 PROCmaximum(first,second)
80 PRINT "and the total of both is ";temp
90 DATA 1,2,3,4,5
100 DATA 6,7,8,9,10
110 END
120 DEF PROCadd
130 FOR loop=1 TO 5
140 READ number
150 temp=temp+number
160 NEXT loop
170 ENDPROC
180 DEF PROCmaximum(max,min)
190 temp=max
200 IF min>max THEN max=min
210 PRINT "max" is greater than ";min
220 ENDPROC
```

Program IV

This uses *PROCAcc* to add the two sets of numbers held in lines 90 and 100, storing their respective sums in *first* and *second*. Then line 70 calls

# Beginners

## From Page 47

PROCmaximum which tells us which of the two sums is the greater.

All this seems simple enough with the only real problem being why we'd want to do it in the first place! However, running the program results in the message:

48 is greater than 15  
and the total of both is 15

which is hardly right.

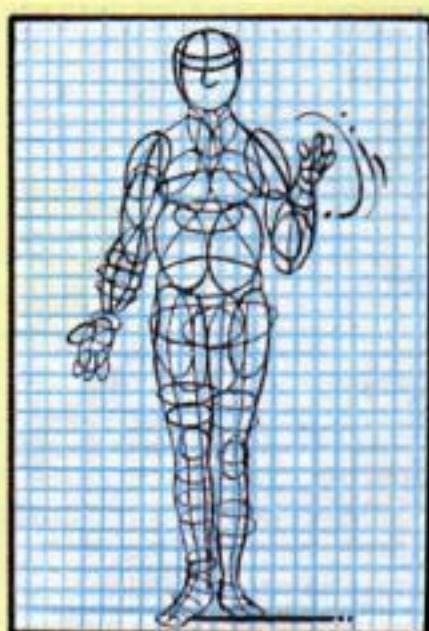
By now you should suspect that the answer is a clash of variables and you'd be right. Can you see which ones?

The answer is *temp* which is used in both procedures but in different ways. The *temp* of PROCmaximum is used to hold the value of the first parameter passed to it.

This is fine but the program

expects that the *temp* of line 80 will still be holding the total sum of all the numbers as it did after PROCadd was called for the second time. And this isn't the case.

The *temp* of PROC-



maximum is a global variable and as such it overwrites any previous value of *temp*.

The solution is fairly obvious. Just add:

185 LOCAL temp

and the program produces:

48 is greater than 15  
and the total of both is 55

Once the effects of PROCmaximum's *temp* are localised then the problem is over.

Notice however that we don't use a line like:

125 LOCAL temp

in PROCadd. This would make PROCadd's *temp* a local variable which might seem to be a good thing but it's not. Try it and see.

The problem is that the

main program uses the value of *temp* calculated by PROCadd. Making it local "hides" it from the rest of the program so it can't be used.

The result is zeros instead of numbers in the final display. So the rule is: If you want to use a variable from a procedure elsewhere in the program, leave it global so the program can get the value out of the procedure.

And that's all you'll get out of me as we've reached the end of the series. By now you should have a fair grasp of Basic and some of the simpler programming techniques.

The rest is up to you as you try to use them in your own programs. Remember, programming is learnt by doing it, not just by reading about it. And your Electron is the best teacher you'll ever have. Have fun. ■

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**IF** you've followed my last series you should have realised that when it comes to debugging programs – or writing them yourselves for that matter – success will often depend on how much thought and preparation went into the program before the keyboard was touched.

Structured is a word often used by experts to describe a program that has been carefully put together using a collection of subroutines, each controlled by a main section.

You can liken this to a prefabricated house with each wall, window or door representing a little program in its own right.

Producing the finished building – linking the modules together according to a predetermined plan – is a much simpler task than trying to create something from the raw materials without any plans whatsoever.

And of course the finished building is much easier to dismantle should the need arise.

You can relate this concept to programming. A well planned idea, using individually written routines, is simpler to put together.

The finished product also benefits from being easy to unravel and consequently easier to debug, both for the writer and for someone who might type in his program.

It will not have gone unnoticed by those who read Pete Bibby's beginners regularly that his articles covering GOSUB and DEF-PROC have persistently tried to get this message across.

To try and give you a practical example of this style of programming I have decided to have a go at putting together a very simple Minefield game that will not only be structured, but also contain some useful ideas that you could incorporate into other programs.

The idea of the game is as old as the hills and very simple.

There are a number of mines hidden in a square grid, and by entering X, Y coordinates, you attempt to find them all in the least-possible

# Groundwork for your first games program

number of goes.

My work of art will be a slight variation on that, consisting of a 10 by 10 grid of boxes in which are hidden 10 little faces that I've christened the Smileys.

You enter the coordinates of the square that you think one of these is in, column first, then row.

If you choose correctly, the Smiley is displayed, accompanied by perhaps a suitable chorus of The Entrance of the Queen of Sheba or something similar.

Should you choose wrongly, you could be greeted by an ear-splitting raspberry or similar noise, and given clues as to the whereabouts of the nearest target.

Well, that's it in theory – the main problem is starting to program it. I thought for a

while and came to a monumental decision – I typed in:

## 10 REM Al's Smiley Hunt

No mug this lad. If I don't manage to get the program working, at least I'll know what it's supposed to do.

Right, then, the first thing to do, and I don't know whether the experts do this, is to plan the program out on paper. So I wrote out a list of routines to carry out the following tasks:

1. Initialise arrays, variables and characters.
2. Show title, draw and set up the grid.
3. Position Smileys.
4. For a set number of Smileys, take input, check and validate.
5. Check input against 3.
6. Show Smiley if correct.
7. Give clue if incorrect.
8. When all Smileys found show how many guesses.

That's enough delay getting to the keyboard – it's about time we got stuck in. We're going to write the game in chunky Mode 5, so line 20 reads:

## 20 MODE 5

Now, I could have used subroutines to carry out all the tasks above, but I decided to use the Electron's "procedures" as they are far more powerful, as you'll see later.

To achieve something resembling the above list, I laid out the program as follows:

```
30 PROCinit
40 PROCtitle
50 PROCgrid
60 PROCSmileys
70 REPEAT
80 PROCinput
90 PROCcheck
100 UNTIL smileys>?
110 PROCfinished
120 PROCresults
```

I thought for a long time how best to set up the two-dimensional grid and store values in the various squares.

There are several ways of doing this, and by far the most efficient way to solve the problem – and Pete Bibby's covered it in his Beginners Series – is the use of an array box(9,9).

I have included this in the

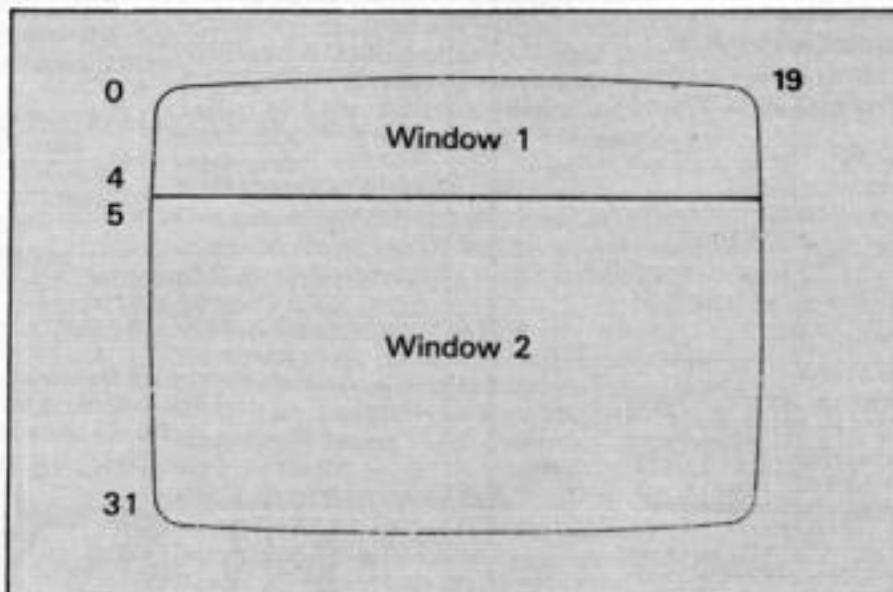


Figure 1: Setting up the two windows



# The Smiley Hunt

Conducted by  
**ALAN McLACHLAN**

first procedure DEFPROCinit along with three VDU23 statements, one to turn off the cursor, line 160, and two to define new characters, lines 170 and 180.

There is also a REM statement at line 130; in fact there will be one at the start of all the procedures to make the program easier to read. The whole routine reads as follows:

```
130 REM*****  
140 DEFPROCinit  
150 DIM box(9,9)  
160 VDU23;82#2;0;0;0;  
170 VDU23,224,0,126,126,1  
26,126,126,126,0  
180 VDU23,225,126,255,153  
,255,189,195,255,126  
185 ENVELOPE 1,1,50,-50,0  
,1,1,0,126,0,0,-126,126,126  
190 ENDPROC
```

The array reserves sufficient memory for 100 boxes, all accessible by the numeric variable *box*. The reason it is 100 locations and not 81 is that it allows for 0 as X and Y subscripts – the numbers in the brackets.

You'll see why I have preferred to use the numbers 0-9 rather than 1-10 later, but for now just settle for the fact that it will be much easier in the long run.

It will make rather a nice display to split the screen into two parts, with the grid in one, and the inputs in another.

Your micro steps in to help

here with a facility to define a text window, but the difficulty I encountered was that I wanted to define two.

I got round this by creating a procedure that would define two different text windows, but only one would be called at any one time.

The power of the procedure command comes into its own here because I was able to pass five different parameters with it. *W* the window number 1 or 2, *col*, *wx*, *wy*, the colour and X, Y coordinates of any text to be printed and of course *A\$* the text itself.

I've called this procedure DEFPROCwindow. The windows shown in Figure 1, are set up in lines 230 and 240, using the command VDU 28, conditional on the number assigned to the variable *W*.

```
200 REM*****  
210 DEFPROCwindow(W,col,w  
x,wy,A$)  
220 COLOUR col  
230 IF W=1 THEN VDU28,0,4  
,19,0  
240 IF W=2 THEN VDU28,0,3  
1,19,5  
250 PRINTTAB(wx,wy);A$  
260 ENDPROC
```

We also want these two windows to have different background colours, window 1 = red, window 2 = black, and this will be done when the PROCwindow is called.

The default logical colours

in Mode 5 are Black (0), Red (1), Yellow (2) and White (3), and I'm going to keep it simple by sticking to these.

You can, if you wish, change any of these to another of the Electron's "actual" colours with a simple VDU 19 statement. This takes the form:

**VDU 19,logical,actual,0,0,0**

where the variable *logical* holds any of the Mode 5 logical colour numbers 0-4, and *actual* any of the actual colour numbers shown on page 141 of the User Guide.

During our game we are going to be using quite a few variables and where possible we'll try to give them names that mean something.

Two important variables are *turns* which I've chosen to signify how many guesses we've had, and *smileys* to indicate the total number of smiling faces we've found.

It is important that these are set to zero when the game is re-run, and we'll do this in the next procedure DEFPROCtitle. The reason I have not

```
270 REM*****  
280 DEFPROCtitle  
290 PROCwindow(1,0,0,0,"  
":COLOUR129:CLS  
300 turns=1:smileys=0  
310 PROCwindow(1,3,2,2,"A  
1's Smiley Hunt")  
320 PROCdelay(2)  
330 ENDPROC
```

included them in DEFPROCinit is that I need to call this procedure at the start of each new game, to re-set the variables.

I have only included in DEFPROCinit the items that need to be initialised once per game. In fact if you try calling DEFPROCinit again you'll generate the error "Bad DIM at line 150" – you just can't re-dimension arrays.

You'll also notice that I've created window 1 by calling PROCwindow for the first time in line 290, but because I only want to clear the screen I have passed zero in all the parameters except the first.

PROCwindow in line 310 however passes all five parameters because I'm printing the title of the game.

If you're anything like me and enjoy seeing your name on the screen, include your own version of *A\$* – be my guest, but don't you dare tell anyone you wrote the program on your own.

While I was writing the program I needed quite a few delay loops to create pauses. I decided to make a procedure out of these that could be called by one command, passing as the parameter the length of the pause.

Line 320 calls this procedure DEFPROCdelay which is held in lines 980-1020. This creates a delay dependent on the digit contained in the variable *number*.

```
980 REM*****  
990 DEFPROCdelay(number)  
1000 FOR delay=1 TO (numbe  
r#1000)  
1010 NEXT delay  
1020 ENDPROC
```

This completes the initialisation stage and if you look back at our list you'll see that the next job is to draw the grid of boxes.

You could show these boxes as any character you wanted, but I've defined a simple shape in line 170 and tagged it CHR\$(224).

To put this character on screen in the form of a grid, we

## From Page 51

simply create two FOR...NEXT loops containing the start and end locations of the screen coordinates, then call PROCwindow again, passing the appropriate variables as parameters.

DEFPROCgrid, after clearing the screen to black, uses two FOR...NEXT loops to generate the X and Y locations of each box - *boxx*, *boxy*. The boxes are then printed on screen using PROCwindow, noting this time it is window 2 that is called, the lower one.

These FOR...NEXT loops are also used to place Os in all the locations in our array *boxx* using line 390.

By the way, don't worry about the missing lines between 400 and 460 - we'll be putting these in next month.

Remember, if you are going to identify your NEXTs, you must put them in reverse order

to the FORs, as in line 400.

```
340 REM*****  
350 DEFPROCgrid  
360 PROCwindow(2,8,8,8,"  
):COLOUR128:CLS  
370 FOR boxx=4 TO 13:FOR  
boxy=7 TO 16  
380 PROCwindow(2,2,boxx,boxy,CHR$224)  
390 box(boxx-4,boxy-7)=0  
400 NEXT boxy:NEXT boxx  
460 ENDPROC
```

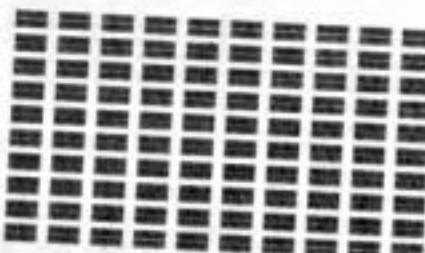
I didn't the first time I typed the line in, and got the error message "No FOR at line 400". You can avoid this slip by not identifying the NEXTs at all, but it makes it easier to read programs if you do.

You can check you've done this right so far by entering a dummy line as in line 55.

55 GOTO 55

Run the program and you should now see in the lower

## AI's Smiley Hunt



window, 100 yellow boxes in 10 rows of 10 on a black background. If you haven't, check everything you've done so far very carefully.

● Well, I think you've had enough for one session. Next

month we'll put in the screen coordinates and look at how to hide the Smileys.

We'll also progress on to the input routine, and check for any correct or incorrect guesses.

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**LINERS***Drink*

**DRINK:** This short program by Andrew Waite draws a refreshing cocktail, and your Electron then proceeds to drink it!

```

1 REM Drink
2 REM By Andrew Waite
3 MODE 1:VDU 23,1,0;0;0
:0;:GCOL 0,2:PROCcircle(158
:1:GCOL 0,3:PROCcircle(158):
:GCOL 0,2:PROCcircle(138):GC
OL 0,3:PROCsectors:GCOL 0,1
29:MOVE 325,600:MOVE 350,10
0:PLOT 87,635,600:PLOT 87,6
00,100:GCOL 0,2
4 MOVE 350,100:MOVE 370
,100:PLOT 85,300,1024:PLOT
85,320,1024:GCOL 0,1:MOVE 3
05,1024:DRAW 355,100:MOVE 3
17,1024:DRAW 365,100:GCOL 0
,3:MOVE 315,800:DRAW 350,10
0:DRAW 600,100
5 DRAW 650,800:DRAW 315
,800:FOR N=1 TO 1000:NEXT:P
RINT TAB(28,15):"CHEERS":GC
OL 0,0:FOR NZ=600 TO 100 ST
EP -1:PLOT 77,500,NZ:NEXT:P
RINT TAB(28,15):"BURP! ":"TA
B(0,0)::END
6 DEF PROCcircle(RX):FD
R,NZ=800+R1 TO 800-R1 STEP
-4:J1=SQR(ABS(RX+RX-(NZ-800
)+((NZ-800))):MOVE 650-J1,NZ
:DRAW 650+J1,NZ:NEXT:ENDPROC
C
7 DEFPROCsectors:FOR N=
8 TO 6.2 STEP 0.7:XI=150*S1
N(N):YI=150+COS(N):MOVE 650
,800:DRAW XI+650,YI+800:NEX
T:ENDPROC

```

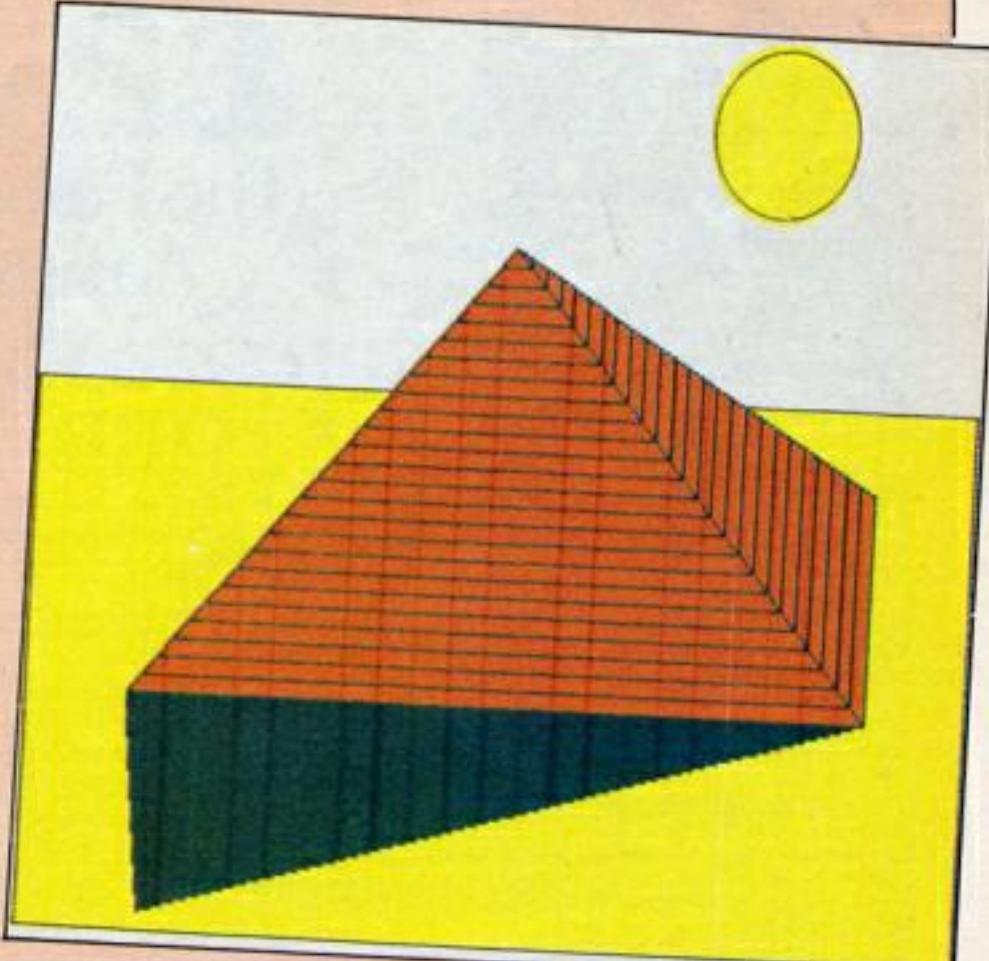
*Pyramid*

**PYRAMID:** Ian Rodgers shows how to produce an impressive graphic display with just a few lines of Basic.

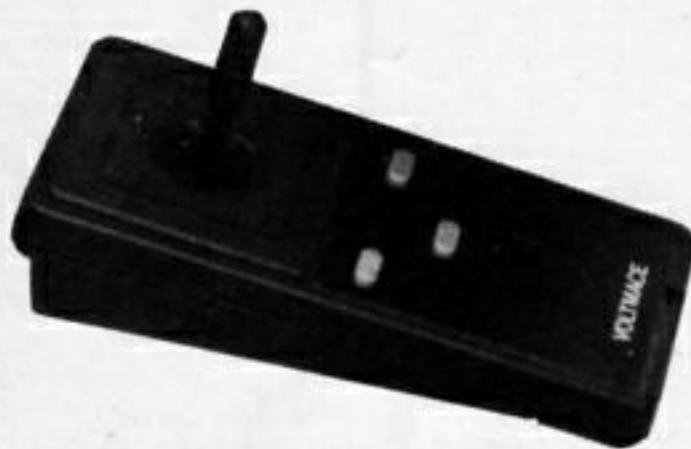
```

1 MODE1:VDU23,1,0;0;0
:19,3,6;0; ,20
2 GCOL 0,3:MOVE 0,1023:
MOVE 1279,1023:PLOT 85,0,60
0:PLOT 85,1279,600:GCOL 0,2
:MOVE 0,600:PLOT 85,1279,0:
PLOT 85,0,0
3 PROCcircle
4 GCOL 0,1:MOVE 140,262
:MOVE 640,762:PLOT 85,1140,
262:PLOT 85,1140,512:GCOL 0
,0:MOVE 640,762:DRAW 1140,2
62:MOVE 140,262:DRAW 640,76
2:DRAW 1140,512:MOVE 140,26
2:MOVE 1140,262:PLOT 85,170
5 AX=140:BX=262:CX=1140
6 FOR STX=1 TO 25:MOVE
AX,BX:DRAW CX,BX:AX=AX+20:B
X=BX+20:CX=CX-20:NEXT
7 DX=512:EX=262:FX=1140
8 FOR STX=1 TO 25:MOVE
FX,EX:DRAW FX,DX:DX=DX+10:E
X=EX+20:FX=FX-20:NEXT
9 A=GET:RUN
10 DEF PROCcircle:FOR I=
1000 TO 800 STEP-4:J=SQR(AB
S(I*1000-(I-900)*(I-900))):M
OVE 1000-J,I:PLOT 5,1000+J,
I:NEXT:ENDPROC

```



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**EPIC ADVENTURES "No true adventurer should be without them."** Electron User 1985.

# Micro Messages

I BOUGHT the Slogger Turbo board for the Electron in kit form some time ago. It is an excellent product and very good value for money.

But how many people have discovered one extra feature not mentioned in the adverts?

In either slow or fast mode, type in or load from cassette a Basic program less than 1200 bytes in length so that TOP remains below &2000.

Now flick the switch on the side of the Electron and, as advised in the instructions, press Control+Break. The program is now seemingly lost – typing OLD results in a Bad program error.

Now type in or load another Basic program, again less than 1200 bytes long.

Flick the switch a second time, press Control+Break, type OLD then LIST – and hey presto, your original program has reappeared!

Again flick the switch, press Control+Break, OLD then LIST, and you find you have your second program again.

This procedure can be repeated, and each program can be run at will. However on searching through the Electron's memory there never seems to be any trace of the other program.

Is there some sort of memory (at least 4k) on board the Turbo driver?

I find the apparent added memory very useful for storing, say, a utility program in slow mode, while working on a program in fast mode.

I can flick between the two at will without the need to save and load each program as

## Hidden extra on the Turbo board

I need it.

The memory above &2000 seems to be common to both slow and fast modes, as a program placed here will not be lost on changing mode. – Ian Brown, Halesowen, West Midlands.

- The Turbo board has 8k of fast ram. This is much quicker to access than the Electron's normal ram.

It is mapped into the bottom 8k of the memory and is only used when the Electron is in Turbo mode.

### Expanding memory

I HOPE you can help me with an idea that I have for increasing the memory of the Electron.

As designed, the machine incorporates 4xTMS4164 dynamic rams (65k\*1 bit) and as you know both the BBC Micro and to an even greater extent the Electron are rather short of memory.

Now I see from an RS catalogue that there is an updated chip called TMS4256, and apart from an extra address line A8, would appear to be pin compatible

and yet giving extra ram.

According to my groggy arithmetic this should double the available user memory, but may slow the computer down a bit. This is no worry as you can obtain the Turbo board, if required. – J. E. Manfield, Churt, Surrey.

- These ram chips would multiply the memory by a factor of four, but it is not a simple matter of swapping the chips over.

The extra ram would have to be paged like sideways ram, so extra hardware would be needed and Basic would have to be re-written to make use of it.

A much simpler method would be to get PMS's second processor.

### Second disc drive

I HAVE an Electron with Plus 1 and Plus 3, which I use in the parish office with View and a GLP printer, all of which is very satisfactory.

I have been thinking of upgrading to a second disc drive, and cannot work out what to do. The Plus 3 manual says that I can add a 5.25in drive, but I would rather add a 3.5in one.

Can you please advise what sort of drive I should be looking for. Should it have its own PSU, or can I use the now redundant mains adaptor/transformer that was replaced by the bigger black one for the Plus 3?

All of this is very confusing for a novice, and most of the advertisements seem aimed at BBC 5.25in disc users.

Electron User to the rescue please. – Richard G. Billinghurst, Diss, Norfolk.

- You can use any size drive

with the Plus 3 providing it has its own power supply.

You'll also need to buy a lead to plug it into the back of the Plus 3.

### Recovering corrupted files

I RECENTLY spent several hours typing in a program from Electron User on to my new Electron.

I corrected my typing errors, ran it and saved it to tape. I've since tried to run the program again but it refuses to load properly.

The block numbers progress from 00 to 0D and then I get the Data? Block? and Rewind tape error messages.

I have tried various volume settings and I've cleaned the heads with no better results. I assume the recording was corrupted during or after the save operation.

Is there any way of recovering part or all of this program, as the thought of retying it does not appeal to me?

Is there any method of checking if a program has saved properly? Should a program only be saved while in Mode 6? – Bob Goodwin, Brentwood, Essex.

- To load the corrupt file use:

\*OPT2,0

\*LOAD \*\* E00

The OPT command tells the Electron to ignore all errors and carry on regardless.

Once the file has loaded enter:

OLD

!TOP=FFFF00

to recover as much as possible.

To check whether a file has

## FRUSTRATION OVER

FOR over eight months I have had a most annoying problem with my Electron set up, which comprises Electron, Plus 1, JP101 printer, running View on rom.

Despite all the usual printer drivers, calls for help from local dealers and of course the string of unanswered mail to Acorn – just how do they communicate, telepathically? Certainly not by letter even

with SAE enclosed – I was unable to program my printer requirements.

Then I bought the August 1986 issue of Electron User and keyed in Ian Brown's View Driver program.

Result: All my problems have been solved. I would ask you therefore to send by most heartfelt thanks to Ian for curing months of frustration. – D. A. Turnbull, Darlington.

## From Page 55

saved correctly try loading it back with:

**\*LOAD "0000**

The file will be loaded to &8000 which is the address of the start of the Basic rom.

This will have no effect on any program currently in memory, but it will tell you whether the file is OK or not.

A file will always load more reliably in Modes 4 – 6 rather than 0 – 3, but we don't know what the effect is on saving. Can any reader enlighten us?

## Printing single sheets

A QUICK query about your excellent printer driver published in Electron User, August 1986.

I am using it with my Mannesmann Tally MT80 and it performs really well – first time round on single sheets.

But the paper out signal is given on subsequent runs and the only way I can prevent this is by re-loading the printer driver.

I suspect this is not the best way – but I cannot program in assembly language so am unable to modify the program myself.

Could you advise me on how to modify the program so that it can handle a succession of single sheets? – D. H. Dalby, Camberley, Surrey.

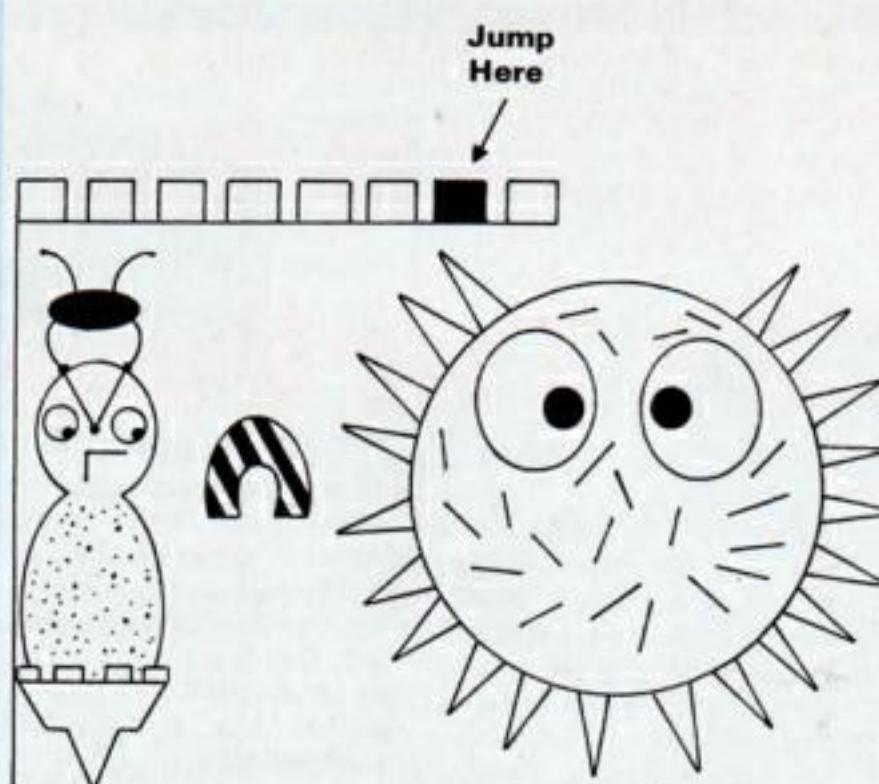
• We have never used a Mannesmann Tally MT80 so we can't say what the problem is. Can any of our readers help?

## Better View from Electron

I AM a nurse tutor and even in nursing, computer aided instruction has arrived. In the school of nursing where I work we have one of the ubiquitous networks of BBC Micros.

Ours is an Amcom E-Net system using BBC Masters. Also incorporated into the network we have one old BBC B with a Torch Z80 disc pack and separate printer, capable of running Wordstar and dBase II.

At home I have an Electron with Plus 1, View, a mono-



chrome monitor and a printer, an Acorn AP-100A (I'm thinking of entering it in the Antique Roadshow).

Nevertheless using it I have just completed the last TMA (Tutor Marked Assignment) of my third Open University undergraduate course.

I have discovered a few facts which may interest readers.

When using View and editing in insert mode, the main command keys take the form of a cursor diamond. The keys used are the same as those for Wordstar.

Format and Line Delete are also the same. The only difference is that on the Electron the function key substitutes the control key. The dBase II editor also uses a cursor diamond.

The same is not true of the BBC Micro version of View, which has its editing control keys located somewhat

illogically amongst the bank of red function keys.

The Electron version seems to me to be both better laid out in ergonomic terms and better in line with the use of these common CP/M applications programs.

Another interesting discovery I have made is that Microtext Plus, the rom version of the authoring system Microtext, works on the Electron.

We use ACP Rom adapter II's on the networked BBC Masters. I found that the cartridge fits into the slot on my Plus 1 and the software works perfectly in all modes except 7. Of course the special teletext effects are not available, but these embellishments can be added later if needed.

One last point I feel I must make is that after two months of daily contact with Masters I have to say that despite the

**WHAT would you like to see in future issues of Electron User?**

**What tips have you picked up that could help other readers?**

**Here is your opportunity to share your experiences.**

**Remember that these are the pages that you**

**write yourselves. So tear yourself away from your Electron keyboard and drop us a line.**

**The address is:**

**Micro Messages  
Electron User  
Europa House  
68 Chester Road  
Hazel Grove  
Stockport SK7 5NY.**

## Beat the blimp

FOR anyone who's been having trouble with Boffin I have discovered how to get past the Puffer Blimp in level 2.

The end of your umbrella is of course sharp and it says in the instructions that the Puffer Blimp is full of air.

Look at the picture to find out where to jump. Also you must keep your umbrella down so that you can burst the Puffer Blimp – Craig Wilson, Glasgow.

• Thanks for the tip Craig, we had a go ourselves and were convinced that it was impossible. We never thought of using the umbrella.

large and impressive case, if I was to do something demanding reliability and ease of use from a computer, I would choose between an Electron and the BBC B.

Congratulations on an excellent magazine. It is heartening to us over-30s to find that a positronic brain is not required to understand all the articles.

I used to take another magazine but the only items I could follow were the classifieds. – Steve Jones, Morriston, Swansea.

## Mailing list needed

I AM the subscriptions secretary for a community newspaper in London and am desperately searching for software to enable me to keep my subscription records on disc and also to print the names and addresses on labels.

Do you know of any mailing list on disc which I could buy?

I have an Electron, Plus 1, Plus 4 from ACP and a disc drive with an Epson LX80 printer.

I am thinking of buying the Protek modem which you've been advertising lately.

In your advert you say that the Electron interface is the

link between the modem and the computer and fits into the cartridge slot of the Electron's Plus 1.

If the two cartridge slots of the Plus 1 are already occupied by View and the Plus 4 interface, where do you put the modem interface? — L.M. Branch, Shepherds Bush, London.

● Slogger's Starword and Starstore II will enable you to store names and addresses and create mailing lists.

Standard letters can be written with Starword and names and addresses pulled from a Starstore II database file.

Starstore II will also enable you to print labels from a file of names and addresses.

You must unplug View when using the interface for the modem.

## Maths answer

I FOUND that in Maths Fun from the October 1986 issue of Electron User the subtraction level produced a decimal number (num2) of at least six places when the first number was 1.

Since num - num2 = ans, num1 has to be greater than 1 to stop this happening.

The following modification:

```
1040 IF type=4 THEN num1=(level*3-2)*10:num1=num1-RND(num1):IF num1<2 THEN 1040 ELSE num2=num1-RND(num1):ans=num1-num2
```

will cure this problem. — Arnold Boyle, Braintree, Essex.

## Shopping for Logo

I HAVE just been given a book on the language Logo for the Electron but I am having trouble in obtaining this on the screen. The book tells me to type in \*LOGO but I find this just produces an error message. Could you please help? — T.P. Murphy, Dartford, Kent.

● To use Logo on the Electron you'll need either Acornsoft's

Turtle Graphics package or the Logo rom cartridge.

Turtle graphics can be found for as little as £3 but logo is about £40. Prices vary so shop around.

## Safe place for BOS

IN THE October 1986 issue of Electron User there was a program called BOS. The accompanying article contained statements which I think could lead to confusion for users of this program.

The author stated that there were no spare pages of memory below PAGE on a cassette-based system. This is not true as pages &9 to &D are often left unused.

It is true that pages &9 and &A are the cassette input/output buffers, but these are only used with cassette files, so simply loading or saving a program will make no difference to these areas of memory.

For cassette users it is much more convenient to leave PAGE at &E00 and store the editor lower down in memory starting at &900.

To do this load in the source code (the assembly listing) and then delete lines 40 to 70, 230 to 240 and change line 250 to:

250 START%=&900

Now delete lines 3910 to 3930 and then save and run the program. All being well the program will now run at &900.

— John Boyers, Middlesbrough, Cleveland.

● Chris Nixon is correct when he says that there are no free pages of memory below PAGE. It is true that pages &9 to &D are often unused but it depends on what you are doing. Confusion can arise when using these areas of memory so if in doubt follow the author's advice and avoid them.

Page &B is used for function key definitions, page &C for character definitions, page &A for files and page &9 for envelopes 4 to 15 amongst other things.

If you are not using function keys, user-defined characters, lots of envelopes or files, page &9 is a safe place to store BOS.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program

they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

## BOS and butties

I WAS interested in the BOS utility in your October 1986 issue and I have typed it in but find that I need some help to use it.

Having answered C to the disc or cassette prompt I was asked to record the code, but when I had done this I was left a bit up in the air with a request to ensure that PAGE is set to &1200 or higher. As a novice it appears to me that the program sets PAGE at that point anyway.

I have an Electron with Plus 1 fitted but no disc drive and I did wonder whether this has anything to do with my difficulty. This is the first utility I have tried.

Could you also please tell me how to get the butty nearest the left hand side of screen 1 – second ledge up – in Jam Butty (Volume 1 Ten of the Best). — Peter Martin, Wallington, Surrey.

● The answer to your first query is that the program does relocate itself to &1200, so unless you personally alter PAGE you can ignore the message.

If you press Break or switch off then on again PAGE will be reset to &E00 and you will have to set it back to &1200.

To edit a program you must first load it then \*RUN BOS – the machine code program created by the original listing in the magazine.

To edit a line enter \*LINE

followed by the line number. Your problem has nothing to do with your equipment.

Now to your second query. The butty is on a dissolving ledge and if you walk to it the ledge will dissolve beneath your feet and you'll fall through the hole.

Taking one step at a time, walk left until the first butty disappears, then hit the left and jump keys together.

You'll bounce off the ledge above and drop past the second butty, picking it up on the way.

## Commanding position

THIS program is the key to near invincibility in Acornsoft's Starship Command.

If you have never seen all eight types of starship, enter and run it before you chain the game in the normal way. You will now find that your energy banks recharge twice as fast as normal.

```
10 P%=&5700
20 [OPT2:PHP:PHA
30 LDA#24:STA$J4B5
40 PLA:PLP:RTS:] 
50 ?&220=0:&221=&57
60 *FX14,4
```

Martin Young, Paisley, Renfrewshire.

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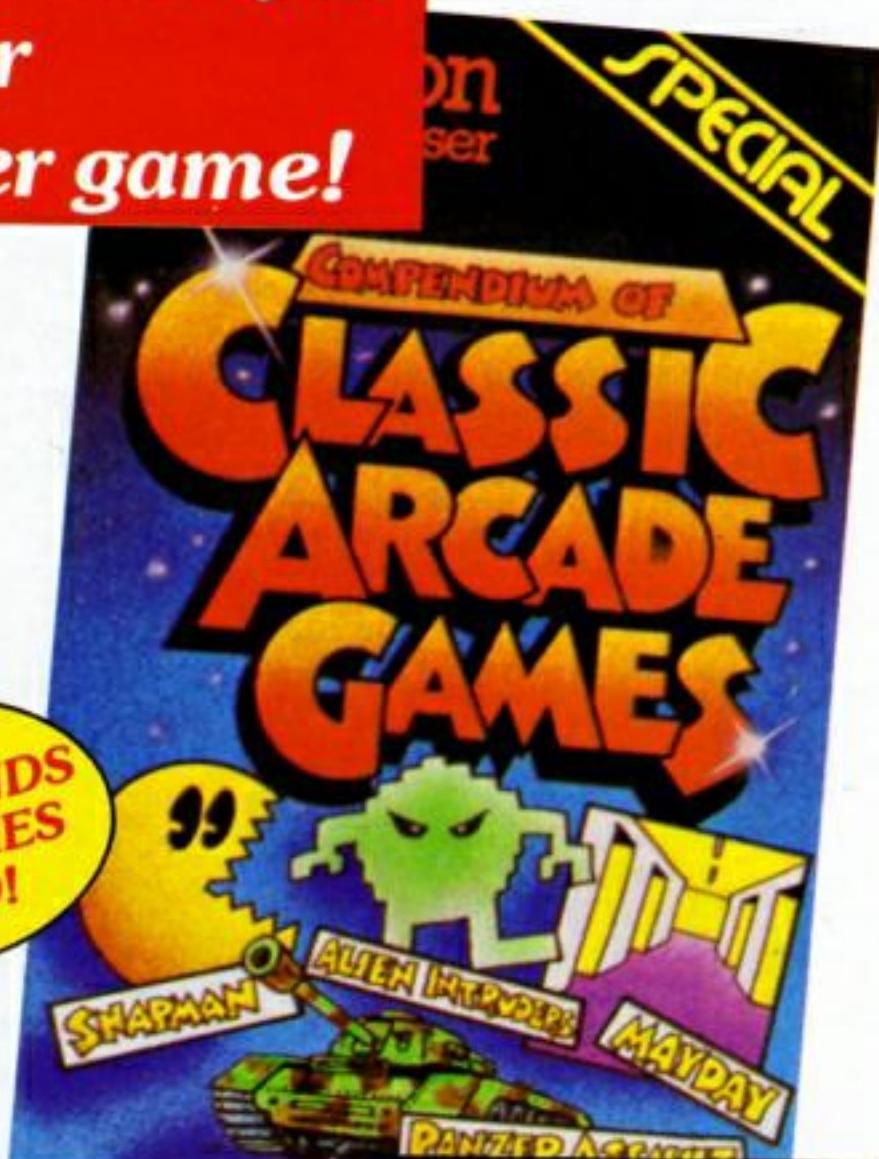


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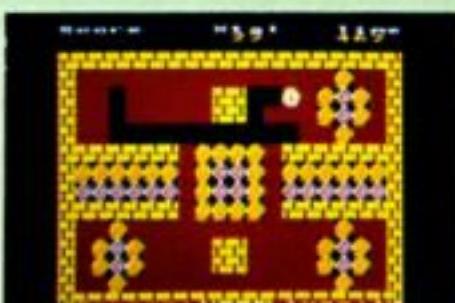
**TO ORDER TURN TO THE FORM ON PAGE 61**

# More great Electron games

This month we introduce a new volume in our Ten of the Best series - 10 more games to give you many hours of fun and entertainment.

These three packages are crammed with the best games from the last 18 months of Electron User. As an added bonus a previously unpublished game has been added to each one - stunning machine code masterpieces from our technical wizard, Roland Waddilove.

So give yourself a treat... with the most popular games compilations we've ever produced.



Jam Butty

## Volume 1

**Jam Butty:** Machine code simulation of high drama on a building site.  
**Golf:** Play a round by yourself, or play against your pals.  
**Haunted House:** Fight against all the odds to get out alive.  
**Space Hike:** Another classic. Help the spacemen avoid marauding monsters.  
**Parky's Peril:** Help Parky through an invisible maze, racing against time.

**Rally Driver:** All the thrills of high-speed driving, with none of the risks.

**Alphaswap:** Your letters are in a twist. Can you put them in order?

**Knockout:** Fast and furious action as you batter down a brick wall.

**Money Maze:** Avoid ghosts and collect coins in an all-action arcade classic.

**Lunar Lander:** The traditional computer game specially written for the Electron.



Atom Smash

## Volume 2

**Atom Smash:** Machine code thrills as you help to save the world from destruction.  
**Bunny Blitz:** Go egg collecting, but keep away from the proliferating rabbits.  
**Castles of Sand:** Build castles - but beware the rising tide and hungry sandworms.  
**Reaction Timer:** Test your reactions with this traffic lights simulation.  
**Solitaire:** The Electron version of the age-old game of logic and patience.

**Jumper:** Jump for your life in this exciting arcade action game.

**Break free:** Test your wits and reflexes in this popular classic ball game.

**Code Breaker:** Crack the code in a colourful if frustrating brainteaser.

**Parachute:** Save the plunging sky divers from a watery end.

**Star Fighter:** Attack the bandit ships in this fast-moving 3D punch-up.



Rockfall

## Volume 3

**Rockfall:** Come diamond mining in this fun packed game with its own screen designer.  
**Karate Warrior:** Win your black belt in this gruelling test of karate skill.  
**Grand Prix:** Battle your way into the lead in this tricky racing simulation.  
**Invasion Force:** Can you survive wave after wave of relentlessly advancing aliens?  
**Grebit:** Guide the frog across the busy road then across the fast-flowing river!

**Fruit Worm:** Steer the worm towards the fruit while avoiding rocks and its ever-growing tail.

**Manic Mole:** Watch out for melting platforms and conveyor belts in your quest for jewels.

**Skramble:** Fly your fighter fast and low over the landscape to penetrate enemy territory.

**Mr Freeze:** You'll need speed and strategy to reach the ice blocks before they melt away.

**Paint Roller:** Steer a speeding roller, run over paint pots but keep clear of the rocks.

**TO ORDER PLEASE USE THE FORM ON PAGE 61**

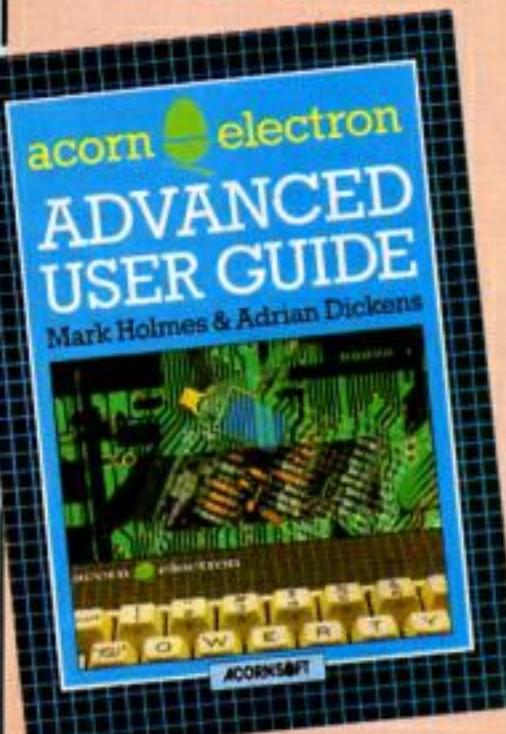
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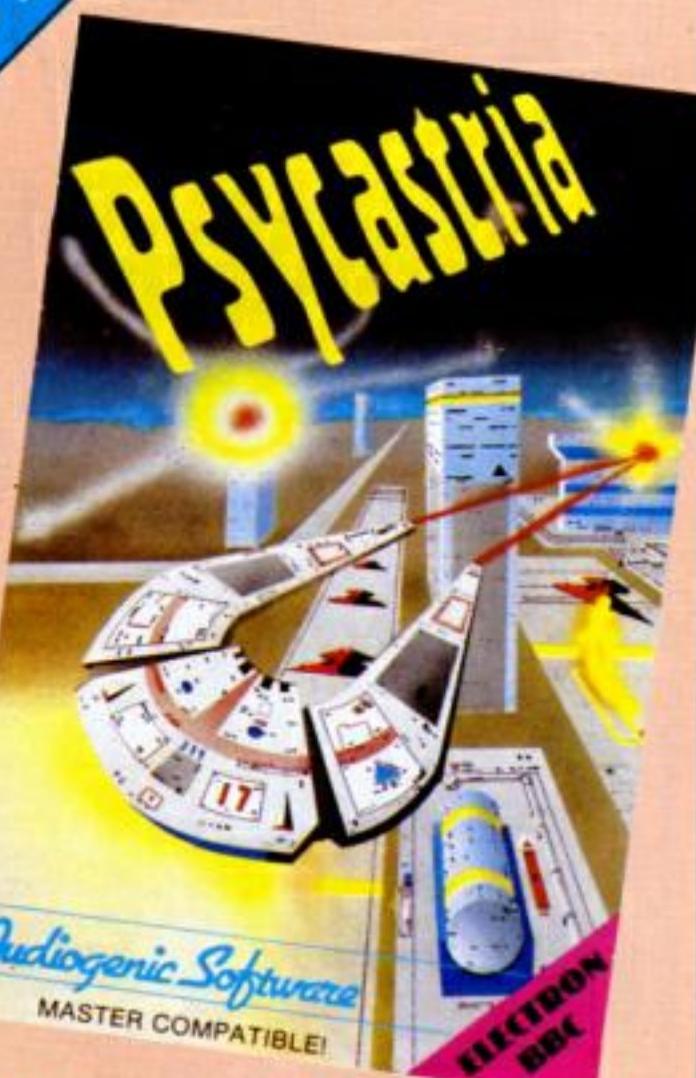
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**Product:** Advanced ROM Manager  
**Price:** £14.95  
**Supplier:** Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey, GU24 8LZ.  
**Tel:** 0276-76545.

**THE Advanced Rom Manager – ARM for short – is a 16k utilities rom with some powerful commands.**

As with all roms from ACP it works equally well on an Electron, BBC B, BBC B+ and Master, so if you decide to upgrade you can take your roms with you.

Figure 1 shows the 12 available commands. Several are only of use if you also have sideways ram or, better still, a friend with a BBC Micro and an eprom blower.

AUTOROM and MAKEROM create roms similar to Acornsoft's Hopper and Snapper rom cartridges. These take files and convert them into a form suitable for putting into an eprom or sideways ram.

The command will take a single file while the second will accept a list of files and turn them into a rom image. This can then be loaded into sideways ram or blown into an eprom.

There is a slight difference between AUTOROM and MAKEROM when it comes to running the files. To run an AUTOROM file stored in rom its name is entered as a star

# An essential tool for machine code

**... and it won't cost you an ARM and a leg. ROLAND WADDILOVE tests the Advanced Rom Manager from ACP**

command.

The files stored using MAKEROM can be accessed using the rom filing system.

This is selected with \*ROM and all the normal LOAD, CHAIN and RUN commands operate as they would with disc or tape. You can't save to rom of course, so SAVE and \*SAVE won't work.

The rom filing system runs at about half the speed of a disc system, so it's quite fast.

I can't really see the use of putting a game on rom, but it would be possible to put TextEd – the simple word processor in the August 1986 issue of *Electron User* – on it so it's instantly available.

RSAVE will save the contents of any specified rom and RLOAD will load a saved rom image into sideways ram.

This is useful if you've got more roms than rom sockets since you can store all your roms on disc.

A rom can be loaded into

sideways ram at the start of a programming or word processing session. RMOVE copies a rom's contents into ram.

GOROM enables you to call a machine code routine in any rom and set the registers on entry.

This would be useful if you had a second processor, since you can run code at any address in the I/O processor – the Electron.

KILL enables you to disable or enable any rom, useful on the Electron since it has an annoying habit of switching to the first language it finds after pressing Control+Break.

This means you can end up in View, Viewsheet, Starmon, Logo or whatever you've got plugged in when you really want Basic. If you KILL the roms you don't need you can prevent this.

As your library of roms builds up you may find that two of them have the same

command. For instance both ARM and Slogger's ElkMan have the command RSAVE, and the first one to be offered the command by the operating system will immediately take it.

OFFER can be used to offer a command to a specific rom, so RSAVE could be offered to either ElkMan or ARM by specifying the rom number.

RDUMP will display the contents of any rom or sideways ram in hex, Ascii or 6502 mnemonics. REX produces a similar display, but will also allow you to edit the contents of sideways ram.

The display can be switched between hex, Ascii and mnemonics at will while browsing through the rom or ram.

The disassembler is one of the best I've seen and will disassemble forwards, backwards, follow JMPs and JSRs, and return when it gets to RTSs.

It's an essential tool for anyone dabbling in machine code.

ROMS will print a list of roms, their number, title string and size. RSUM calculates a checksum and CRC for each one.

I don't know why you'd need to know the CRC for a rom, but anyway it's there if you want it.

Although ARM is an excellent package, at first I wasn't too taken with it as several of the commands are repeated in ACP's ADT, which is a superb rom.

However ARM wins hands down when it comes to price, at £14.95 representing amazing value for money. Go out and buy this real bargain. ■

```
Advanced ROM Manager 1.11
AUTOROM <fsp> <title> <fsp>
GOROM <rom> <start> (A/X/Y)
(<rom>) ...
<rom> <command>
MAKEROM <fsp> <title> <fsp> ...
<rom> <(start)> <(end)> <(b)>
<rom> <(start)> <(b)>
RLOAD <fsp> <rom>
<rom> <(dest)> <(start)> <(end)>
ROMS <rom> ...
RSUM <rom>
(<rom>) ...
```

OS 1.00

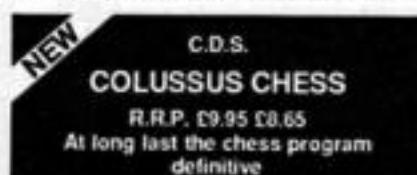
Figure 1:  
ARM's 12 commands

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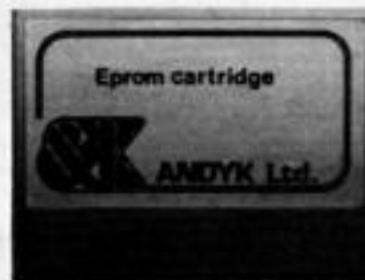
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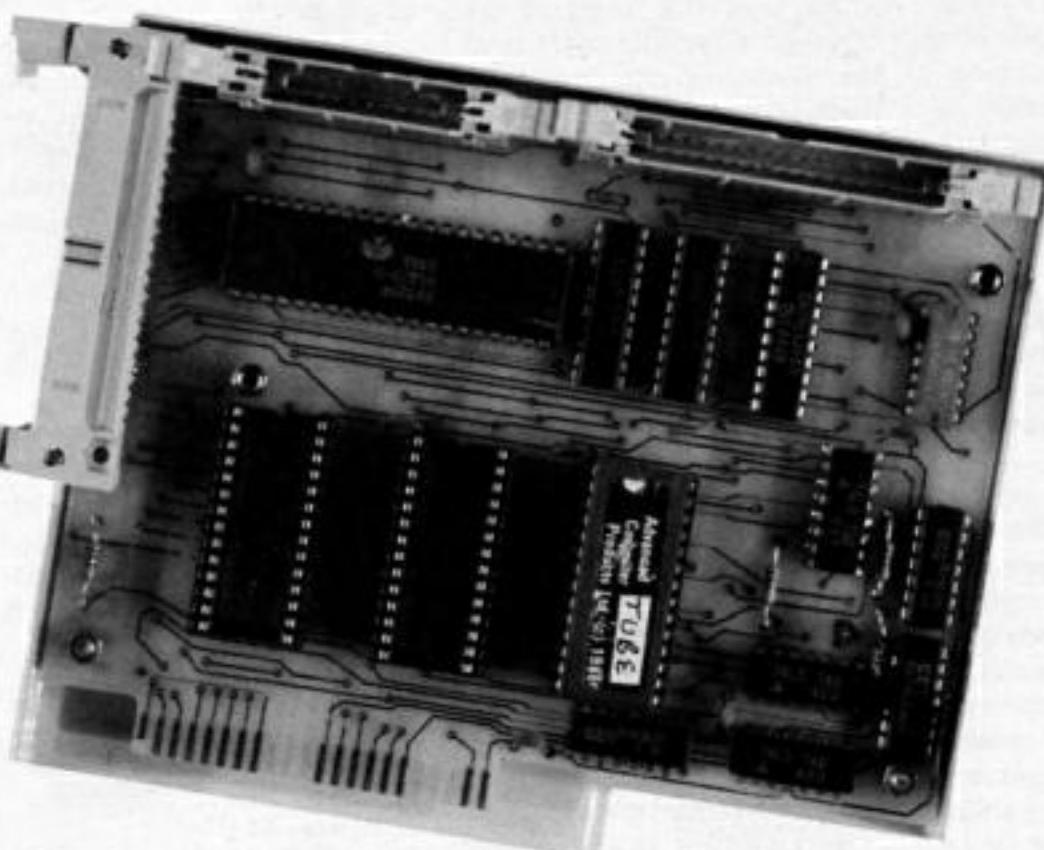


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# Any port in a storm



I HAVE always viewed the Electron as a BBC Micro with all the nice parts removed, because my main interest is interfacing all sorts of gadgets to computers.

This is made particularly easy on the BBC Micro and particularly difficult on the Electron.

Now, however, the AP5 interface from Advanced Computer Products at a stroke gives the Electron those ports that are so useful on its big brother.

It occurred to the editor that some of you might not be familiar with the ways a BBC Micro can be attached to all sorts of equipment.

So he has asked me to take a break from my usual role on *The Micro User* to explain what this remarkable device can do.

It must be emphasised that this is not a review of the product but rather a taster of some of the exciting projects you can undertake with its help.

In *The Micro User* I write a monthly column on interfacing and hardware projects called

## MIKE COOK takes the AP5 interface and shows how useful it can be

the Beeb Bodybuilding Course.

Although some slight modifications to the driving software might be needed, most projects I have done should now run on the Electron with the AP5.

The articles have covered a wide range of interfacing so let's see what use can be made from the user port, 1MHz bus and Tube provided by the AP5.

The user port is perhaps the most useful port. On the BBC Micro this is mapped into addresses &FE60 to &FE6F whereas the AP5 has it at &FCBO to &FCBF.

This means that the software will have to be changed to reflect the new position of the port - an almost trivial task which should not prevent operation of any project.

A user port consists of eight data lines that can be programmed to be input or output. In addition there are two control lines that can be

used to handshake the data lines.

Handshaking is the protocol involved in data transfer, and it normally consists of a signal indicating that fresh data is on the lines and that the receiving station is ready to receive it.

Most digital devices can be interfaced to the Electron using this port. It enables you to sense the state of switches or turn things on and off.

For instance in the July 1983 issue of *The Micro User* I produced a transition board and cable (Body Build Packs 1 &2) to allow simple screw connection to the port.

Then I showed how you could make a simple "steady hands" game using this and an old coat hanger.

In the following August and September issues I showed how you could use the outputs to control small relays and even mains devices.

Motor control can also be achieved using the user port and in the May 1984 issue of

*The Micro User* I showed how to control stepping motors, and DC motors were covered in the November 1985 issue.

As well as control some interesting devices may be made to fit on this port.

One example for those interested in monitoring weather information was the anemometer (wind speed) in the June 1985 issue and the weather vane (wind direction) in October 1986.

For those interested in precise measurement the 4 1/2 digit DVM (digital voltmeter) can give a reading in volts from -1.9999 to +1.9999. This was featured in the April 1985 issue.

If you want to synthesise sounds the digital to analog converter in the October and November 1984 issues lets you create any sound waveform you like.

If you need more than eight bits of data on the user port

## HARDWARE REVIEW

### From Page 67

this can be expanded to 32 inputs and 32 outputs using a multiplexer board featured in the December 1985 issue.

The 1MHz bus (pronounced one MegaHertz) is a memory mapped area of the computer's memory for attaching devices that require more than the simple single eight bits provided by the user port.

Using this bus you can attach devices that require several address locations to drive them. The bus has room for 512 bytes of space divided into two 256 byte pages.

The AP5 board has some space in these pages that you can't use. These are in page & FC but all page & FD is free.

In the Bodybuilding Course I have used this to add extra user ports to the computer.

The user port extension board in the August 1984 issue adds two chips to the bus to give you in effect four

more user ports. It allows the computer to control several devices at the same time.

The board uses a block of 16 addresses in page & FC and the AP5 interface does not have a usable block that long.

However, the solution is quite simple — move the user port expansion board to page & FD. This involves cutting a track and making a link on the Body Build board.

Another project that uses the 1MHz bus was the very successful sound sampler featured in January, February, and March 1986.

This enables you to digitise any sound and read it into the computer. Once in there you can manipulate and mangle the sound before sending it out. This allows you to produce stutter effects currently in vogue in pop music.

In addition you can get real time echo and frequency shifts as well as being able to produce music derived from

the sampled sound.

This project should fit on to the AP5 without any modification. However some of the software will have to be changed slightly to work with the Electron's different architecture.

Also the AP5 does not have an input to the audio amplifier like the BBC Micro's 1MHz port, so you will have to feed the output of the sound sampler into an amplifier.

The final port on the AP5 board is the Tube, which allows you to connect a second processor to your Electron.

There are several different types of second processor on the market each having its own strengths.

Generally a second processor gives more memory and speed by moving the computational aspect of your programs out of the Electron.

It handles the number crunching while the Electron

handles the input from the keyboard and the output to the screen. This division of labour results in much faster running of programs.

The second processor takes over the personality of the Electron and it will feel like you are driving a new computer. However, there are certain types that do act remarkably similarly to the Electron.

Looking at the AP5 shows it to be constructed to a high standard, it looks solid and robust.

So the AP5 interface opens up the Electron for a whole new type of computing, and you thought you were just getting your Electron mastered! ■

**Product:** AP5 Interface  
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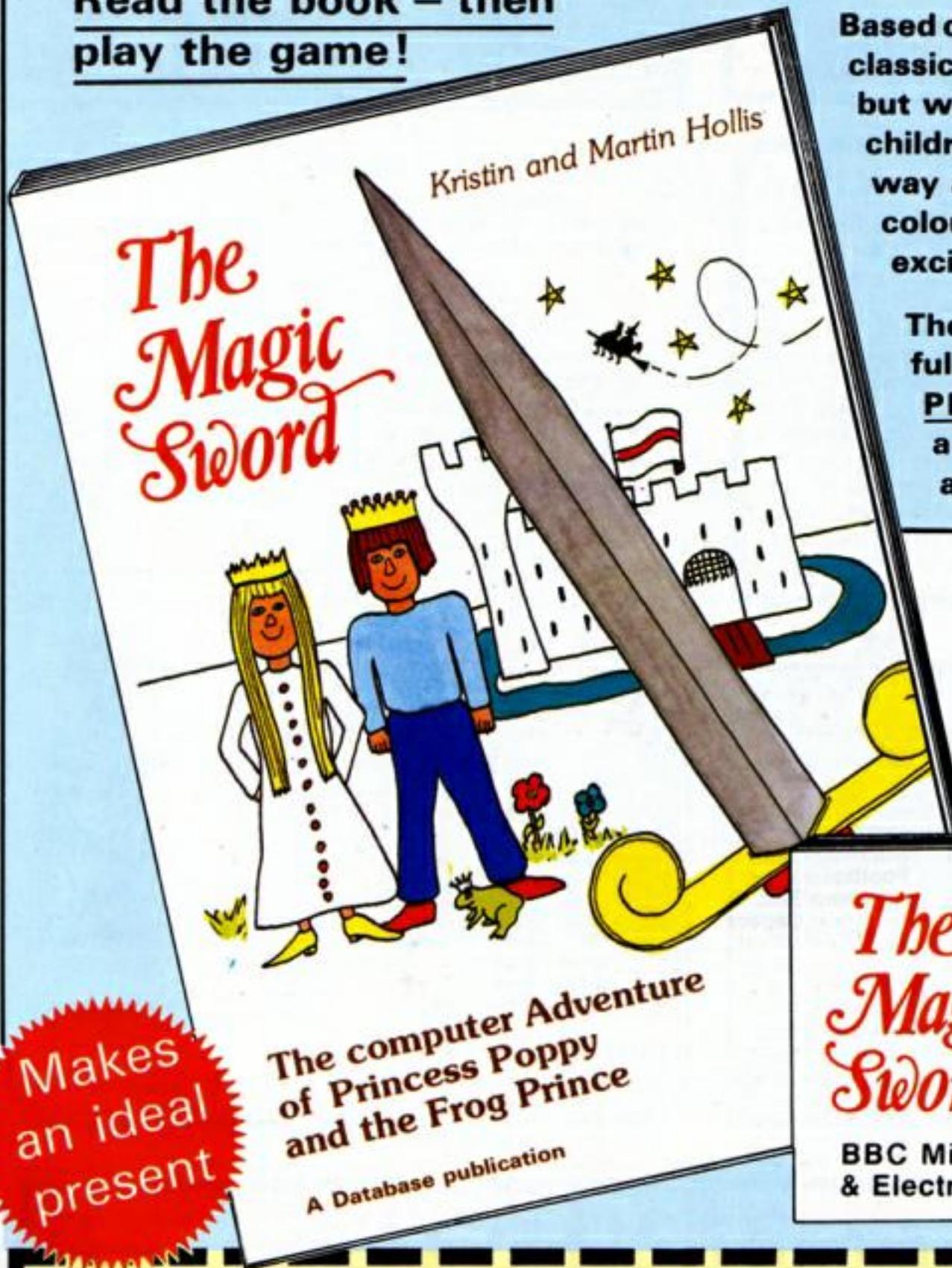
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